

78-SDP-04-89

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**2003 Annual Water Quality Report  
and Leachate Control System Performance  
Evaluation**

**Anderson Excavating - Council Bluffs C&D**

*ANDEX*  
**Landfill, Council Bluffs, IA**

*PER 16*  
**Permit No. 78-SDP-04-89P**

*SAWG*  
**Project No. ANDEX 03001**

*MSCR*  
**November 26, 2003**

**BARKER LEMAR**  
ENGINEERING CONSULTANTS

November 26, 2003

Ms. Amie Hart  
Iowa Department of Natural Resources  
900 E. Grand Avenue  
Wallace State Office Building  
Des Moines, IA 50319

**RE: 2003 Annual Water Quality Report and  
Leachate Control System Performance Evaluation  
Council Bluffs C&D Landfill  
Permit No. 78-SDP-04-89P  
Project No. ANDEX 03001**

1300 CUMMINS ROAD

SUITE 201

DES MOINES, IOWA 50315

515.256.8814

515.256.0152 (F)

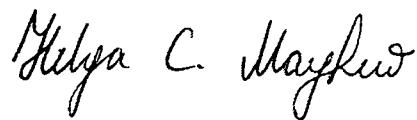
[www.barkerlemar.com](http://www.barkerlemar.com)

Dear Amie:

**BARKER LEMAR ENGINEERING CONSULTANTS (BARKER LEMAR)**, on behalf of the Anderson Excavating Company, has completed the water quality monitoring and assessment for the above-referenced site for the year 2003. Our services were performed in general accordance with Iowa Administrative Code (IAC) Section 113.26(4) and the current requirements for implementation of the Hydrologic Monitoring System Plan (HMS). Please find enclosed a copy of the 2003 Annual Water Quality Report and Leachate Control System Performance Evaluation (LCSPE) for the above-referenced site.

If you have any questions regarding this report, please contact us at 515/256-8814.

Sincerely,  
**BARKER LEMAR ENGINEERING CONSULTANTS**



Helga C. Mayhew  
Project Manager



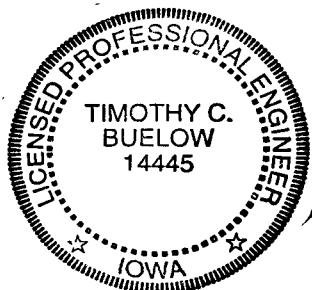
Christine L. Collier, E.I.  
Project Manager

cc: Addressee  
Mr. Virgil Anderson - Anderson Excavating Company  
IDNR Field Office #4  
File  
QA/QC

**BARKER LEMAR**  
ENGINEERING CONSULTANTS

**2003 ANNUAL WATER QUALITY REPORT &  
LEACHATE CONTROL SYSTEM PERFORMANCE EVALUATION  
ANDERSON EXCAVATING  
COUNCIL BLUFFS C&D LANDFILL  
Council Bluffs, Iowa  
Permit No. 78-SDP-04-89P  
Project No. ANDEX 03001  
NOVEMBER 26, 2003**

I hereby certify that this engineering document was prepared by me or under my direct personal supervision, and that I am a duly licensed Professional Engineer under the laws of the State of Iowa.



T. C. Buelow  
Timothy C. Buelow, P.E.

11-26-03  
Date

My license renewal date is December 31, 2003.

Pages or sheets covered by this seal: All

**BARKER LEMAR**  
ENGINEERING CONSULTANTS

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2003 ANNUAL WATER QUALITY REPORT &  
LEACHATE CONTROL SYSTEM PERFORMANCE EVALUATION  
ANDERSON EXCAVATING  
COUNCIL BLUFFS C&D LANDFILL  
Council Bluffs, Iowa  
Permit No. 78-SDP-04-89P  
Project No. ANDEX 03001  
NOVEMBER 26, 2003

## **1.0 INTRODUCTION**

**BARKER LEMAR ENGINEERING CONSULTANTS (BARKER LEMAR)**, on behalf of our client, Anderson Excavating, completed groundwater sampling at the above-referenced site. Sampling was performed in general accordance with Iowa Administrative Code (IAC) Section 113.26(4) and the provisions identified in the landfill permit. This report addresses water quality data collected during the 2003 sampling events and discusses the following issues:

- Observations made during the collection of groundwater samples;
- Results of the physical parameters measured during sample collection;
- The statistical treatment and evaluation of the chemical data;
- Changes or maintenance needed in the monitoring system; and
- Provides a summary listing of analytical data, statistical computation results, graphs of statistical exceptions, and a digital copy of data.

## **2.0 FIELD ACTIVITIES AND PROCEDURES**

Groundwater monitoring wells were developed and sampled by **BARKER LEMAR** personnel on April 17, 2003 and October 15, 2003. These activities represent the regular spring and fall semi-annual sampling events for 2003. Water samples from six (6) groundwater monitoring wells were collected during these events. Sampling forms and analytical reports for the April sampling event were submitted previously. Sampling forms for the October sampling event are included in Appendix A.

The general groundwater field measurement and sampling procedures used are outlined below:

- Static water levels and total well depths were measured using an electronic water level indicator.
- Wells were purged of approximately three well volumes or until dry using dedicated Waterra® development/sampling pumps and/or disposable bailers. Groundwater elevations were measured before and after well development.
- Field measurements of pH, temperature, and specific conductance were collected during development to be used as indicators of well conditions prior to sample collection.
- Groundwater samples were collected by using the Waterra® pump and/or disposable bailer and by transferring the samples into laboratory-prepared containers. Bailers were used to facilitate collection of groundwater samples from the very deep monitoring wells. The samples collected for dissolved metals analysis were filtered using 0.45 micron filters.
- Samples were submitted for laboratory analysis under chain-of-custody procedures. Analysis was performed as indicated in the Hydrologic Monitoring System Plan (HMSP) and IAC 567 Sections 113.26(4)(e) and (f) and the provisions identified in the landfill permit.

### **3.0 MONITORING SYSTEM**

The groundwater monitoring system in-place at the site is comprised of six monitoring wells (MW-2, MW-3, MW-4, MW-9, MW-10, and MW-11). Figure 1 shows the location of the monitoring system points.

#### **3.1 GROUNDWATER MONITORING SYSTEM**

Two groundwater regimes (the upper aquifer or water table aquifer and the lower aquifer or basal sand aquifer) are monitored by the corresponding monitoring wells, as shown in Table 1.

**TABLE 1**  
**MONITORING WELL PLACEMENT**

REGIME	MONITORING WELLS
Upper or Surficial Aquifer (Aquifer 1)	Upgradient: MW-3 Downgradient: MW-2, MW-9, MW-11
Lower Aquifer (Aquifer 2)	Upgradient: MW-4 Downgradient: MW-10

#### **4.0 MONITORING SYSTEM PERFORMANCE EVALUATION**

The hydrologic monitoring system was re-evaluated to determine the reliability of the performance of the monitoring well points based on the following tasks.

- The high and low groundwater levels were compared to well depth/screened interval.
- Water level conditions in the monitoring wells were reviewed to evaluate possible changes in the hydrologic setting/flow paths due to landfilling activities.
- Well depths were measured to evaluate integrity and siltation.
- A visual inspection of well integrity was performed during the sampling event.

#### **4.1 WATER LEVEL MEASUREMENTS**

The results of the water level measurements and well depth measurements are shown in Table 2 (Summary of Groundwater Levels and Well Performance) on the next page. The data indicate groundwater elevations ranged from 1060.63 to 1085.07 feet above sea level (ASL) when both sampling events are compared. Groundwater levels were generally observed to decrease from the spring sampling event to the fall event with the fluctuation ranging from 1.06 feet in MW-11 to 1.95 feet in MW-10.

Water levels were observed to be within the screened interval in monitoring wells MW-2, MW-3, MW-9, and MW-11 during at least one of the two sampling events during 2003. The remaining wells were observed to have water levels above the reported top of screen elevations.

Water levels in the monitoring wells have been sufficient to yield ground water samples for the six monitoring wells during both the April and October sampling events. Sampling was completed with disposable bailers, with the exception of MW-2, when the use of a Waterra pump was necessary.

**TABLE 2**  
**SUMMARY OF GROUNWATER LEVELS AND WELL PERFORMANCE**

Anderson Excavating Company  
 Council Bluffs C&D Landfill  
 Council Bluffs, Iowa  
 Permit No. 78-SDP-04-89P  
 Project No. ANDEX 03001

WELL	TOC	TOS	TD	DATUM	DATE OF MEASUREMENT	
					April 17, 2003	October 15, 2003
MW-1 *	1128.44	1006.55	129.9	GROUNDWATER LEVEL	NM	NM
				GROUNDWATER ELEVATION	NA	NA
				MEASURED WELL DEPTH	NM	NM
MW-2	1128.28	1075.86	62.4	GROUNDWATER LEVEL	56.19	57.98
				GROUNDWATER ELEVATION	1072.09	1070.30
				MEASURED WELL DEPTH	60.9	60.8
MW-3	1196.12	1087.12	119.0	GROUNDWATER LEVEL	111.05	112.60
				GROUNDWATER ELEVATION	1085.07	1083.52
				MEASURED WELL DEPTH	116.9	118.7
MW-4	1195.65	1001.01	199.6	GROUNDWATER LEVEL	133.61	135.02
				GROUNDWATER ELEVATION	1062.04	1060.63
				MEASURED WELL DEPTH	202 +	150 +
MW-8 *	1155.08	1007.22	158.9	GROUNDWATER LEVEL	NM	NM
				GROUNDWATER ELEVATION	NA	NA
				MEASURED WELL DEPTH	NM	NM
MW-9	1153.87	1076.22	92.7	GROUNDWATER LEVEL	76.88	78.31
				GROUNDWATER ELEVATION	1076.99	1075.56
				MEASURED WELL DEPTH	93.0	93.0
MW-10	1167.89	1010.44	167.5	GROUNDWATER LEVEL	103.12	105.07
				GROUNDWATER ELEVATION	1064.77	1062.82
				MEASURED WELL DEPTH	167.3	150 +
MW-11	1167.84	1080.31	102.5	GROUNDWATER LEVEL	93.54	94.6
				GROUNDWATER ELEVATION	1074.30	1073.24
				MEASURED WELL DEPTH	102.5	102.5

NOTES: All measurements in feet.

NA - Not Available.

NM - Not Measured.

TOC - Top of casing elevation, reference for water level measurements.

TOS - Top of screen elevation.

TD - Total depth (as originally reported).

\* Well used for water level measurement only.

#### **4.2 GROUNDWATER FLOW**

Limited groundwater contours were determined for the upper aquifer, or water table, using water elevation data collected by **BARKER LEMAR** personnel on October 15, 2003. These contours are presented in Figure 1. The general flow direction was to the southeast. Potentiometric surface elevations are shown in Figure 2. Groundwater contours were indeterminate for the potentiometric surface and limited for the upper aquifer due to well abandonments in the northeast portion of the site. A review of historical water level data shows little change throughout the years.

#### **4.3 WELL SILTATION**

The monitoring well depths measured during the last two sampling events were generally within 2.15 feet of the installed depth for the wells with data available. Based on the ability of the dedicated purging system to remove accumulated sediment, it appears unlikely the siltation will adversely impact the groundwater monitoring points at this site.

#### **4.4 SAMPLING POINT OBSERVATIONS**

The protective caps were reported broken on monitoring wells MW-2, MW-3, and MW-4. These problems will be addressed by landfill staff in 2004. In general, other problems regarding the integrity of the monitoring wells or sampling points were not noted.

### **5.0 DATA EVALUATION METHODS**

The statistical evaluation of the chemical data was completed in accordance with IAC 567 Section 113.26(6).

#### **5.1 WELL GROUPING**

The groundwater regimes discussed in Section 3.1 were evaluated separately. An upgradient monitoring point has been selected from each group for statistical comparison. The selection of upgradient points has been based on the hydrogeological assessments performed by others, the measured chemical and physical data, and guidance provided by the IDNR.

## **5.2 CONTROL LIMITS**

Once the groupings were completed, the mean, standard deviation, and control limits were calculated for each of the chemical parameters in the upgradient monitoring point. The control limit represents the limit at which a statistical exceedance beyond the background concentrations has occurred. For the purpose of this evaluation, the control limits are defined as the mean of the concentrations for the upgradient monitoring point plus/minus two times the standard deviation for each parameter. The lower control limit is only used for evaluation of pH levels.

## **5.3 METHOD DETECTION LIMITS**

Many of the parameters were observed at concentrations less than the method detection limits (MDLs). The mean, standard deviation, and control limit are computed by utilizing the reporting limit value in the computations (i.e., <0.05 becomes 0.05). In situations where the upgradient monitoring point concentrations were below the MDLs, the standard deviation and control limits were not calculated. It should be noted that in some cases in which control limits were not calculated for the aforementioned reason, the measured downgradient concentration exceeded the upgradient mean.

## **5.4 REGULATORY ACTION LIMITS**

In addition to evaluating the concentration in comparison to upgradient control limits, the concentrations are also compared to current United States Environmental Protection Agency (USEPA) Maximum Contaminant Levels (MCLs), Negligible Risk Levels (NRLs) and Health Advisory Levels (HALs). IDNR guidance documents define the "action level" for groundwater as the following:

*"As defined by 567 - 133.2 (455B, 455E), action level means the HAL, if one exists. If there is no HAL, then the NRL, if one exists. If there is no HAL or NRL, then the MCL. If there is no HAL, NRL, or MCL, an action level may be established by the department based on current technical literature and recommended guidelines of the USEPA and recognized experts, on a case-by-case basis."*

During the April and October 2003 sampling events, the arsenic concentrations in monitoring well MW-2 exceeded the NRL of 0.00002 mg/L, but were below the MCL of 0.010 mg/L.

## **6.0 EVALUATION OF WATER QUALITY PARAMETERS**

The analytical results of the upgradient and downgradient monitoring wells are presented in Appendix B (Summary of Groundwater Chemistry). The analytical data reports for October are included in Appendix C. Parameters were graphed in relation to the current upgradient mean and standard deviation for each group. Results that exceeded the current upgradient control limits are presented in the Exceedance Tables in Appendix D. The graphs depicting the changes of each parameter in each downgradient monitoring point are included in Appendix E. Note, some graphs depict values that exceed the upper control limit and are not included in the summary of exceedances table. These values are not reported as exceedances due to the upper control limit being less than the detection level of that parameter's test method.

## **7.0 SUMMARY AND RECOMMENDATIONS**

A summary of the exceedances computed for the downgradient monitoring wells is shown in Table 3.

**TABLE 3**

### **SUMMARY OF EXCEEDANCES**

Parameter	MW-2	MW-10
Chloride		4, 10
Dissolved Arsenic	10	

4 = April 2003 Sampling Event

10 = October 2003 Sampling Event

Based on these results, BARKER LEMAR recommends continued routine semi-annual sampling and annual water sampling for the parameters listed in IAC Chapter 113.26(4)(e) and (f) and as stated in the current operating permit and amendments. We also recommend continued sampling of arsenic at substituted upgradient well MW-3 to monitor existing conditions and continued semi-annual sampling for arsenic in monitoring well MW-2 until three consecutive sampling events result in arsenic levels below the lowest Chapter 133 action levels or the method detection limit.

## **8.0 LEACHATE CONTROL SYSTEM PERFORMANCE EVALUATION**

The leachate collection system at the Council Bluffs C&D Landfill consists of three perforated collection pipes that drain into a main header (Figure 3). This empties into a 12,000 gallon storage tank. The storage tank will be replaced by a storage lagoon, when needed. In addition, a perforated pipe was added at the top of the compacted trench of the main header line. This will provide an extra collection pipe along the east toe of the current fill area. The leachate that accumulates in the storage tank is pumped from the tank and then recirculated within the current lined waste area. The Council Bluffs Landfill Leachate Tank Readings showing percent of tank full for 2003 are shown in appendix F. The tank was pumped out once during this reporting period.

## **9.0 GENERAL COMMENTS**

The analysis and opinions expressed in this report are based upon data obtained from the samples collected at the indicated locations and from any other information discussed in this report. This report does not reflect any variations in subsurface stratigraphy, hydrogeology, or chemical concentrations that may occur between sampling locations or across the site. Actual subsurface conditions may vary and may not become evident without further exploration.

**BARKER LEMAR** has prepared this report for the exclusive use of our client for the specific application to the project discussed. No warranty is expressly stated or implied in this report with regard to the conditions of substrate and groundwater below the surface of the facility. **BARKER LEMAR** has relied upon information furnished by others as noted in the report, and **BARKER LEMAR** accepts no responsibility for any deficiency, misstatements, or inaccuracy in this report as a result of misstatements, omissions, misrepresentations, fraudulent, or inaccurate information or data provided by others.

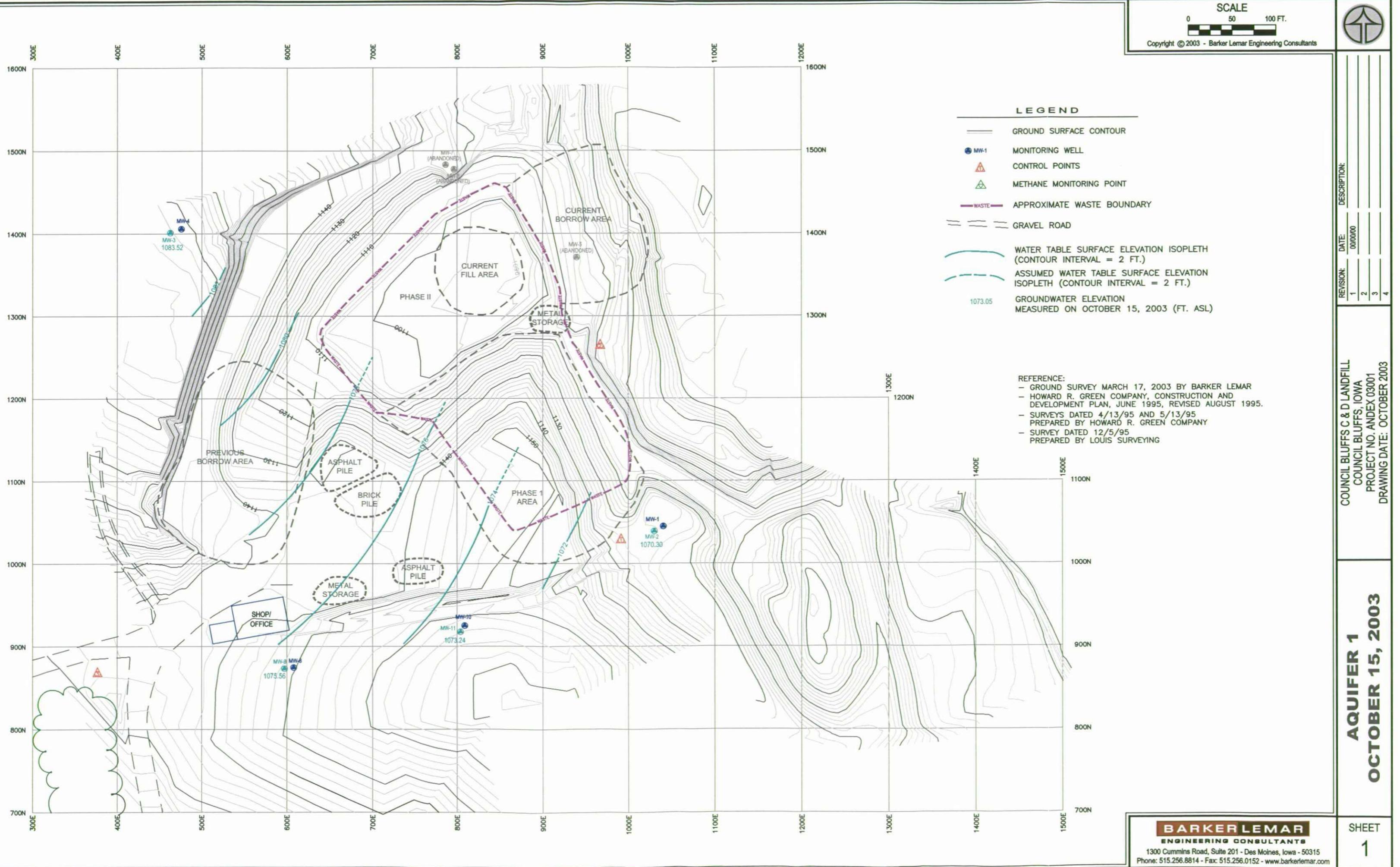
## 10.0 REFERENCES

1. Iowa Department of Natural Resources. *Annual Report 1997, Registry of Hazardous Waste or Hazardous Substance Disposal Sites and Hazardous Waste Remedial Fund.* Dated January 1, 1998.
2. Howard R. Green Company, Consulting Engineers. *Hydrogeological Investigation Report.* Dated June 1995.
3. Howard R. Green Company, Consulting Engineers. *Hydrologic Monitoring System Plan.* Dated June 1995.
4. Barker Environmental Services, Inc. *1997 Annual Water Quality Report, Anderson Excavating Company C&D Landfill.* Dated December 3, 1997.
5. Barker, Lemar & Associates, Inc. *1998 Annual Water Quality Report, Anderson Excavating Company C&D Landfill.* Dated November 25, 1998.
6. Barker, Lemar & Associates, Inc. *1999 Annual Water Quality Report, Anderson Excavating Company C&D Landfill.* Dated November 29, 1999.
7. Barker, Lemar & Associates, Inc. *2000 Annual Water Quality Report, Anderson Excavating Company C&D Landfill.* Dated November 28, 2000.
8. **BARKER LEMAR ENGINEERING CONSULTANTS.** *2001 Annual Water Quality Report and Leachate Control System Performance Report, Anderson Excavating Company C&D Landfill.* Dated November 28, 2001.
9. **BARKER LEMAR ENGINEERING CONSULTANTS.** *2002 Annual Water Quality Report and Leachate Control System Performance Report, Anderson Excavating Company C&D Landfill.* Dated November 18, 2002.

**FIGURES**  
**GROUNDWATER CONTOUR MAPS**

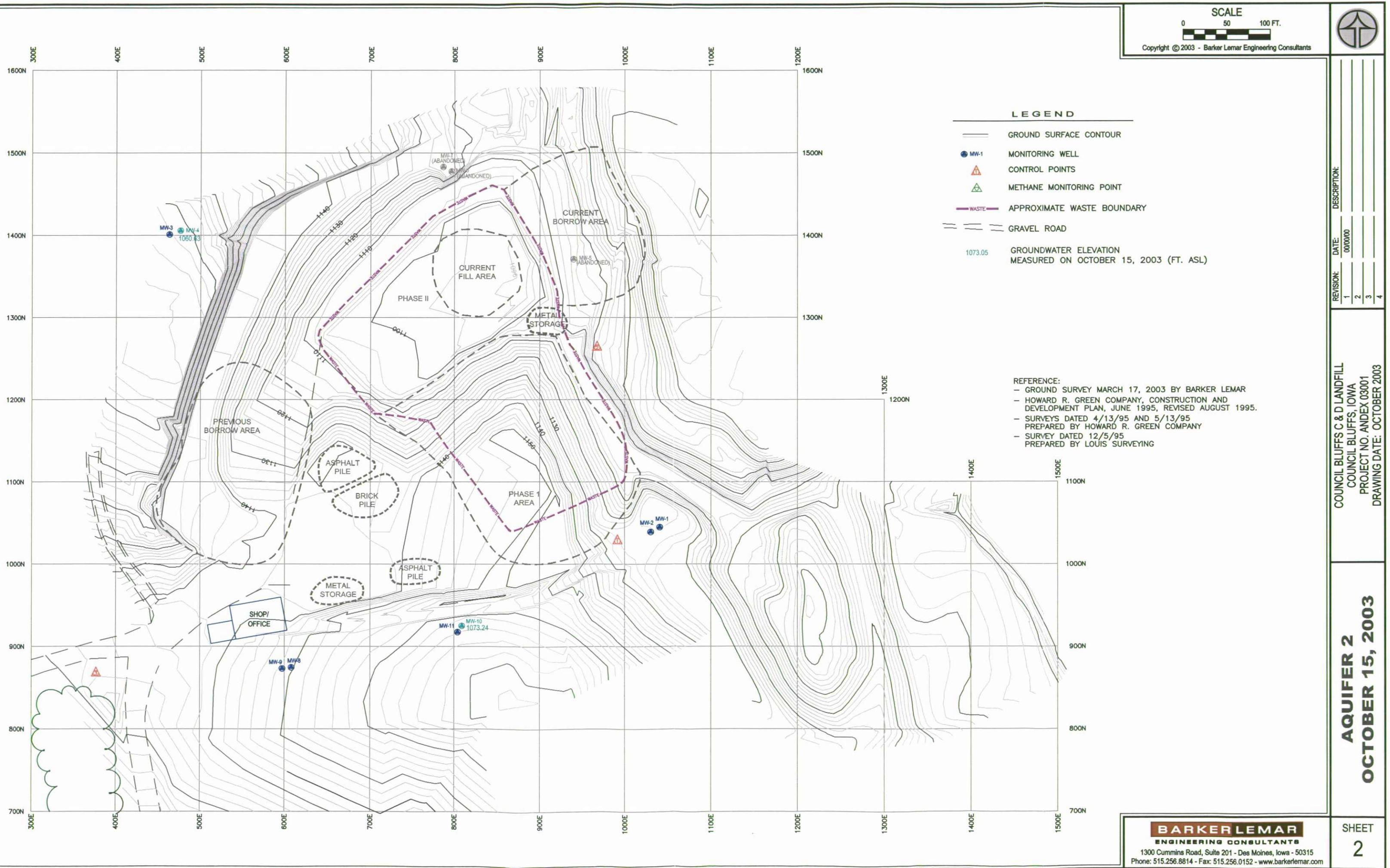
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**APPENDIX A**  
**SAMPLING FORMS**

## LANDFILL GROUNDWATER SAMPLING DATA SHEET

**Project Information**

Project Name: Anderson Excavating Co.  
 Project Location: Council Bluffs C&D  
 Project Number: ANDEX 03001  
 SLF Permit No. 78-SDP-04-89P  
 Weather Conditions: Cloudy, 60 degrees F, 2-5 mph wind

**Sampling Information**

Date Sampled:	<u>10/15/03</u>
Sampling Crew:	<u>Mike Martin</u>
Equipment:	<u>Water Level Heron pH/Cond. Hanna</u>

Well No.	Date	Static Water Level (ft.)	Measured Well Depth (ft.)	Well Purging Information								Well Properly Capped (Y / N)	Litter or Standing Water (Y / N)	Comments Time Sampled
				Time at Start of Purging	Volume Purged (gals.)	Water Depth After Purging (ft.)	Water Depth Before Sampling	Purging Equipment (see note 1)	Stabilized pH (S.U.)	Stabilized Conductivity (uS/cm)	Stabilized Temperature (Celcius)			
MW-2	10/15/03	57.98	60.8	3:20 PM	2	Dry	58.62	W	6.73	513	13.7	N	N	3:40 PM, protective cap broken
MW-3	10/15/03	112.60	118.7	2:10 PM	3	Dry	114.03	B	6.78	872	13.2	N	N	2:30 PM, protective cap broken
MW-4	10/15/03	135.02	150 +	2:40 PM	12	135.05	135.05	B	6.93	493	12.8	N	N	3:00 PM, protective cap broken
MW-9	10/15/03	78.31	93.0	4:40 PM	7	86.15	86.15	B	7.04	521	13.1	Y	N	4:55 PM
MW-10	10/15/03	105.07	150 +	3:45 PM	12	105.10	105.10	B	6.98	574	12.9	Y	N	4:05 PM
MW-11	10/15/03	94.60	102.5	4:10 PM	4	98.71	98.71	B	7.13	541	13.3	Y	N	4:25 PM

Note 1: VALID TYPES - Bailer (B), Submersible (S), Waterra (W), Vacuum Pump (V), Dedicated Bailer (DB), Other (describe in comments)

# FORM FOR GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT

Site Name	<u>Anderson Excavating Co.</u>	Permit No.	<u>78-SDP-04-89P</u>
MW/Piezometer No.	<u>MW-2</u>	Upgradient	<u></u>
		Downgradient	<u>X</u>
Name of Person Sampling	<u>Mike Martin</u>		

## A. MONITORING WELL/PIEZOMETER CONDITIONS

Well/Piezometer Capped?	<u>No</u>	Standing Water/Litter?	<u>No</u>
If NO, Explain	<u>Protective cap broken</u>		

## B. GROUNDWATER ELEVATION MEASUREMENT (+/- 0.01 foot, MSL)

Top of Casing Elevation	<u>1128.28</u>	feet	Ground Elevation (ft.)	<u>1126.86</u>
Drilled Well Depth (ft.)	<u>62.4</u>	feet	Casing Dia. (in.)	<u>4.0</u>
Measured Well Depth (ft.)	<u>60.8</u>	feet		

Equipment Used	<u>Heron</u>		
----------------	--------------	--	--

Groundwater Level (+/- 0.01 foot below top of inner casing, MSL):

	Date	Time	Depth to Groundwater (ft.)	Groundwater Elevation
Before Purging	<u>October 15, 2003</u>	<u>3:20 PM</u>	<u>57.98</u>	<u>1070.30</u>
After Purging	<u>10/15/2003</u>	<u>3:20 PM</u>	<u>Dry</u>	<u>Dry</u>
Before Sampling	<u>10/15/2003</u>	<u>3:20 PM</u>	<u>58.62</u>	<u>1069.66</u>

## C. WELL PURGING\*

Quantity of Water Removed from Well (gallons)	<u>2</u>
No. of Well Volumes (based on current water level)	<u>1.1</u>
Was well pumped/bailed dry?	<u>Yes</u>

Equipment Used:			
Bailer Type	<u>Not Used</u>	Dedicated Bailer?	<u>No</u>
Pump Type	<u>Waterra</u>	Dedicated Pump?	<u>Yes</u>

If not dedicated, method of cleaning \_\_\_\_\_

## D. FIELD MEASUREMENTS\*

Weather Conditions	<u>Cloudy, 60 degrees F, 2-5 mph wind</u>		
--------------------	-------------------------------------------	--	--

Field Measurements (after stabilization):

Temperature	<u>13.7</u>	Units	<u>Celsius</u>
Equipment Used	<u>Hanna</u>		
pH	<u>6.73</u>	Units	<u>Standard Units</u>
Equipment Used	<u>Hanna</u>		
Spec. Conductance	<u>513</u>	Units	<u>uS/cm.</u>
Equipment Used	<u>Hanna</u>		

COMMENTS	_____		
----------	-------	--	--

IDNR Form 542-1322

\* - Omit if only measuring groundwater elevations.

# FORM FOR GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT

Site Name	Anderson Excavating Co.	Permit No.	78-SDP-04-89P
MW/Piezometer No.	MW-3	Upgradient	X
		Downgradient	
Name of Person Sampling	Mike Martin		

## A. MONITORING WELL/PIEZOMETER CONDITIONS

Well/Piezometer Capped?	No	Standing Water/Litter?	No
If NO, Explain	Protective cap broken	If YES, Explain	

## B. GROUNDWATER ELEVATION MEASUREMENT (+/- 0.01 foot, MSL)

Top of Casing Elevation	1196.12	feet	Ground Elevation (ft.)	1195.12
Drilled Well Depth (ft.)	119.0	feet	Casing Dia. (in.)	4.0
Measured Well Depth (ft.)	118.7	feet		

Equipment Used	Heron
----------------	-------

Groundwater Level (+/- 0.01 foot below top of inner casing, MSL):

	Date	Time	Depth to Groundwater (ft)	Groundwater Elevation
Before Purging	October 15, 2003	2:10 PM	112.60	1083.52
After Purging			Dry	Dry
Before Sampling			114.03	1082.09

## C. WELL PURGING\*

Quantity of Water Removed from Well (gallons)	3
No. of Well Volumes (based on current water level)	0.7
Was well pumped/bailed dry?	Yes

Equipment Used:			
Bailer Type	Bailer	Dedicated Bailer?	No
Pump Type	Not Used	Dedicated Pump?	No

If not dedicated, method of cleaning	disposable bailer
--------------------------------------	-------------------

## D. FIELD MEASUREMENTS\*

Weather Conditions	Cloudy, 60 degrees F, 2-5 mph wind
--------------------	------------------------------------

Field Measurements (after stabilization):

Temperature	13.2	Units	Celsius
Equipment Used	Hanna		
pH	6.78	Units	Standard Units
Equipment Used	Hanna		
Spec.Conductance	872	Units	uS/cm.
Equipment Used	Hanna		

## COMMENTS

IDNR Form 542-1322

\* - Omit if only measuring groundwater elevations.

# FORM FOR GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT

Site Name	Anderson Excavating Co.	Permit No.	78-SDP-04-89P
MW/Piezometer No.	MW-4	Upgradient	X
		Downgradient	
Name of Person Sampling	Mike Martin		

## A. MONITORING WELL/PIEZOMETER CONDITIONS

Well/Piezometer Capped?	No	Standing Water/Litter?	No
If NO, Explain	Protective cap broken	If YES, Explain	

## B. GROUNDWATER ELEVATION MEASUREMENT (+/- 0.01 foot, MSL)

Top of Casing Elevation	1195.65	feet	Ground Elevation (ft.)	1194.01
Drilled Well Depth (ft.)	199.6	feet	Casing Dia. (in.)	4.0
Measured Well Depth (ft.)	150 +	feet		

Equipment Used	Heron
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Groundwater Level (+/- 0.01 foot below top of inner casing, MSL):

	Date	Time	Depth to Groundwater (ft)	Groundwater Elevation
Before Purging	October 15, 2003	2:40 PM	135.02	1060.63
After Purging			135.05	1060.60
Before Sampling			135.05	1060.60

## C. WELL PURGING

Quantity of Water Removed from Well (gallons)	12
No. of Well Volumes (based on current water level)	0.3
Was well pumped/bailed dry?	No

Equipment Used:			
Bailer Type	Bailer	Dedicated Bailer?	No
Pump Type	Not Used	Dedicated Pump?	No

If not dedicated, method of cleaning	disposable bailer
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## D. FIELD MEASUREMENTS

Weather Conditions	Cloudy, 60 degrees F, 2-5 mph wind
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Field Measurements (after stabilization):

Temperature	12.8	Units	Celsius
Equipment Used	Hanna		
pH	6.93	Units	Standard Units
Equipment Used	Hanna		
Spec.Conductance	493	Units	uS/cm.
Equipment Used	Hanna		

## COMMENTS

\* - Omit if only measuring groundwater elevations.

# FORM FOR GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT

Site Name	<u>Anderson Excavating Co.</u>	Permit No.	<u>78-SDP-04-89P</u>
MW/Piezometer No.	<u>MW-9</u>	Upgradient	<u></u>
		Downdrain	<u>X</u>
Name of Person Sampling	<u>Mike Martin</u>		

## A. MONITORING WELL/PIEZOMETER CONDITIONS

Well/Piezometer Capped?	<u>Yes</u>	Standing Water/Litter?	<u>No</u>
If NO, Explain	<u></u>		

## B. GROUNDWATER ELEVATION MEASUREMENT (+/- 0.01 foot, MSL)

Top of Casing Elevation	<u>1153.87</u>	feet	Ground Elevation (ft.)	<u>1151.22</u>
Drilled Well Depth (ft.)	<u>92.7</u>	feet	Casing Dia. (in.)	<u>2.0</u>
Measured Well Depth (ft.)	<u>93.0</u>	feet		

Equipment Used	<u>Heron</u>		
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Groundwater Level (+/- 0.01 foot below top of inner casing, MSL):

	Date	Time	Depth to Groundwater (ft)	Groundwater Elevation
Before Purging	<u>October 15, 2003</u>	<u>4:40 PM</u>	<u>78.31</u>	<u>1075.56</u>
After Purging	<u>10/15/03</u>	<u>4:40 PM</u>	<u>86.15</u>	<u>1067.72</u>
Before Sampling	<u>10/15/03</u>	<u>4:40 PM</u>	<u>86.15</u>	<u>1067.72</u>

## C. WELL PURGING\*

Quantity of Water Removed from Well (gallons)	<u>7</u>
No. of Well Volumes (based on current water level)	<u>2.9</u>
Was well pumped/bailed dry?	<u>No</u>

Equipment Used:			
Bailer Type	<u>Bailer</u>	Dedicated Bailer?	<u>No</u>
Pump Type	<u>Not Used</u>	Dedicated Pump?	<u>No</u>
If not dedicated, method of cleaning	<u>disposable bailer</u>		

## D. FIELD MEASUREMENTS\*

Weather Conditions	<u>Cloudy, 60 degrees F, 2-5 mph wind</u>		
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Field Measurements (after stabilization):

Temperature	<u>13.1</u>	Units	<u>Celsius</u>
Equipment Used	<u>Hanna</u>		
pH	<u>7.04</u>	Units	<u>Standard Units</u>
Equipment Used	<u>Hanna</u>		
Spec. Conductance	<u>521</u>	Units	<u>uS/cm.</u>
Equipment Used	<u>Hanna</u>		

## COMMENTS

IDNR Form 542-1322

\* - Omit if only measuring groundwater elevations.

# FORM FOR GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT

Site Name	<u>Anderson Excavating Co.</u>	Permit No.	<u>78-SDP-04-89P</u>
MW/Piezometer No.	<u>MW-10</u>	Upgradient	<u>                  </u>
		Downgradient	<u>X</u>
Name of Person Sampling	<u>Mike Martin</u>		

## A. MONITORING WELL/PIEZOMETER CONDITIONS

Well/Piezometer Capped?	<u>Yes</u>	Standing Water/Litter?	<u>No</u>
If NO, Explain	<u>                  </u>		

## B. GROUNDWATER ELEVATION MEASUREMENT (+/- 0.01 foot, MSL)

Top of Casing Elevation	<u>1167.89</u>	feet	Ground Elevation (ft.)	<u>1165.44</u>
Drilled Well Depth (ft.)	<u>167.5</u>	feet	Casing Dia. (in.)	<u>2.0</u>
Measured Well Depth (ft.)	<u>150 +</u>	feet		

Equipment Used	<u>Heron</u>		
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Groundwater Level (+/- 0.01 foot below top of inner casing, MSL):

	Date	Time	Depth to Groundwater (ft)	Groundwater Elevation
Before Purging	<u>October 15, 2003</u>	<u>3:45 PM</u>	<u>105.07</u>	<u>1062.82</u>
After Purging	<u>                  </u>	<u>                  </u>	<u>105.10</u>	<u>1062.79</u>
Before Sampling	<u>                  </u>	<u>                  </u>	<u>105.10</u>	<u>1062.79</u>

## C. WELL PURGING\*

Quantity of Water Removed from Well (gallons)	<u>12</u>
No. of Well Volumes (based on current water level)	<u>1.2</u>
Was well pumped/bailed dry?	<u>No</u>

Equipment Used:			
Bailer Type	<u>Bailer</u>	Dedicated Bailer?	<u>No</u>
Pump Type	<u>Not Used</u>	Dedicated Pump?	<u>No</u>

If not dedicated, method of cleaning	<u>disposable bailer</u>		
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## D. FIELD MEASUREMENTS\*

Weather Conditions	<u>Cloudy, 60 degrees F, 2-5 mph wind</u>		
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Field Measurements (after stabilization):

Temperature	<u>12.9</u>	Units	<u>Celsius</u>
Equipment Used	<u>Hanna</u>		
pH	<u>6.98</u>	Units	<u>Standard Units</u>
Equipment Used	<u>Hanna</u>		
Spec.Conductance	<u>574</u>	Units	<u>uS/cm.</u>
Equipment Used	<u>Hanna</u>		

## COMMENTS

IDNR Form 542-1322

\* - Omit if only measuring groundwater elevations.

# FORM FOR GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT

Site Name	Anderson Excavating Co.	Permit No.	78-SDP-04-89P
MW/Piezometer No.	MW-11	Upgradient	
		Downdrain	X
Name of Person Sampling	Mike Martin		

## A. MONITORING WELL/PIEZOMETER CONDITIONS

Well/Piezometer Capped?	Yes	Standing Water/Litter?	No
If NO, Explain			

## B. GROUNDWATER ELEVATION MEASUREMENT (+/- 0.01 foot, MSL)

Top of Casing Elevation	1167.84	feet	Ground Elevation (ft.)	1165.31
Drilled Well Depth (ft.)	102.5	feet	Casing Dia. (in.)	2.0
Measured Well Depth (ft.)	102.5	feet		

Equipment Used	Heron
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Groundwater Level (+/- 0.01 foot below top of inner casing, MSL):

	Date	Time	Depth to Groundwater (ft)	Groundwater Elevation
Before Purging	October 15, 2003	4:10 PM	94.60	1073.24
After Purging			98.71	1069.13
Before Sampling			98.71	1069.13

## C. WELL PURGING

Quantity of Water Removed from Well (gallons)	4
No. of Well Volumes (based on current water level)	3.1
Was well pumped/bailed dry?	No

Equipment Used:			
Bailer Type	Bailer	Dedicated Bailer?	No
Pump Type	Not Used	Dedicated Pump?	No

If not dedicated, method of cleaning	disposable bailer
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## D. FIELD MEASUREMENTS

Weather Conditions	Cloudy, 60 degrees F, 2-5 mph wind
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Field Measurements (after stabilization):

Temperature	13.3	Units	Celsius
Equipment Used	Hanna		
pH	7.13	Units	Standard Units
Equipment Used	Hanna		
Spec. Conductance	541	Units	uS/cm.
Equipment Used	Hanna		

## COMMENTS

IDNR Form 542-1322

\* - Omit if only measuring groundwater elevations.

**APPENDIX B**  
**SUMMARY OF GROUNDWATER CHEMISTRY**

## Summary of Groundwater Chemistry

Council Bluffs Construction and Demolition Landfill - 78-SDP-01-89

Parameter	Date	MW-2	MW-3	MW-4	MW-5	MW-7	MW-9	MW-10	MW-11
		DN1	UP1	UP2	UP1	UP2	DN1	DN2	DN1
Chemical Oxygen Demand - mg/L	11/8/1996	NM	NM	NM	<5.00	<5.00	6.00	<5.00	5.60
	2/27/1997	<5.00	NM	NM	<5.00	<5.00	6.20	<5.00	<5.00
	5/12/1997	NM	NM	NM	<5.00	23.0	<5.00	6.50	<5.00
	7/23/1997	NM	NM	NM	6.70	<5.00	<5.00	<5.00	<5.00
	10/16/1997	NM	NM	NM	<5.00	<5.00	<5.00	<5.00	<5.00
	4/7/1998	<5.00	NM	NM	<5.00	<5.00	<5.00	<5.00	<5.00
	10/16/1998	<5.00	NM	NM	<5.00	<5.00	<5.00	<5.00	<5.00
	4/16/1999	<5.00	NM	NM	<5.00	<5.00	<5.00	<5.00	<5.00
	10/7/1999	<5.00	NM	NM	<5.00	<5.00	<5.00	NM	<5.00
	4/5/2000	<10.0	<10.0	14.0	NM	NM	<10.0	NM	<10.0
	10/12/2000	<10.0	<10.0	50.0	NM	NM	<10.0	<10.0	<10.0
	3/27/2001	<10.0	<10.0	56.0	NM	NM	<10.0	NM	NM
	4/6/2001	NM	NM	NM	NM	NM	NM	<10.0	<10.0
	10/3/2001	<10.0	<10.0	55.0	NM	NM	<10.0	<10.0	NM
	4/23/2002	<10.0	<10.0	53.0	NM	NM	<10.0	<10.0	NM
	4/30/2002	NM	<10.0						
	10/3/2002	<10.0	<10.0	30.0	NM	NM	<10.0	<10.0	<10.0
	4/17/2003	6.50	6.00	8.50	NM	NM	5.30	8.40	9.80
	10/15/2003	<5.00	<5.00	<5.00	NM	NM	<5.00	<5.00	<5.00
Chloride - mg/L	11/8/1996	NM	NM	NM	<5.00	<5.00	<5.00	18.0	9.80
	2/27/1997	<5.00	NM	NM	<5.00	<5.00	<5.00	19.0	10.0
	5/12/1997	NM	NM	NM	<5.00	5.20	<5.00	25.0	10.0
	7/23/1997	NM	NM	NM	<5.00	5.60	<5.00	28.0	9.80
	10/16/1997	NM	NM	NM	<5.00	6.10	<5.00	<5.00	<5.00
	4/7/1998	<5.00	NM	NM	5.00	6.50	<5.00	<5.00	<5.00
	10/16/1998	<5.00	NM	NM	<5.00	5.50	5.90	10.0	7.60
	4/16/1999	<5.00	NM	NM	19.0	19.0	27.0	19.0	19.0
	10/7/1999	<5.00	NM	NM	<5.00	<5.00	<5.00	NM	8.60
	4/5/2000	<10.0	24.0	<10.0	NM	NM	<10.0	NM	<10.0
	10/12/2000	<10.0	34.0	14.0	NM	NM	<10.0	15.0	<10.0
	3/27/2001	<10.0	38.0	<10.0	NM	NM	<10.0	NM	NM
	4/6/2001	NM	NM	NM	NM	NM	NM	14.0	23.0
	10/3/2001	<10.0	51.0	14.0	NM	NM	<10.0	29.0	NM
	4/23/2002	<10.0	54.0	17.0	NM	NM	17.0	28.0	NM
	4/30/2002	NM	<10.0						
	10/3/2002	<10.0	52.0	11.0	NM	NM	<10.0	23.0	<10.0
	4/17/2003	<5.00	58.9	6.80	NM	NM	11.4	34.7	9.60
	10/15/2003	<5.00	52.3	5.30	NM	NM	7.80	35.2	9.10
Iron, Dissolved - mg/L	11/8/1996	NM	NM	NM	<0.100	0.110	0.110	0.140	0.640
	2/27/1997	0.470	NM	NM	0.980	0.190	<0.100	0.530	<0.100
	5/12/1997	NM	NM	NM	0.220	0.290	0.140	<0.100	<0.100
	7/23/1997	NM	NM	NM	0.230	0.160	0.130	<0.100	0.110
	10/16/1997	NM	NM	NM	<0.100	<0.100	<0.100	<0.100	<0.100
	4/7/1998	<0.100	NM	NM	<0.100	<0.100	<0.100	<0.100	<0.100
	10/16/1998	<0.100	NM	NM	<0.100	<0.100	<0.100	<0.100	<0.100
	4/16/1999	<0.100	NM	NM	<0.100	<0.100	<0.100	<0.100	<0.100
	10/7/1999	<0.100	NM	NM	<0.100	<0.100	<0.100	NM	0.750
	4/5/2000	<0.030	0.267	<0.030	NM	NM	<0.030	NM	<0.030
	10/12/2000	<0.030	<0.030	0.100	NM	NM	<0.030	<0.030	<0.030
	3/27/2001	<0.030	0.105	0.143	NM	NM	<0.030	NM	NM
	4/6/2001	NM	NM	NM	NM	NM	NM	<0.030	<0.030
	10/3/2001	<0.030	<0.030	0.106	NM	NM	<0.030	<0.030	NM
	4/23/2002	<0.030	<0.030	0.092	NM	NM	<0.030	<0.030	NM
	4/30/2002	NM	0.206						
	10/3/2002	<0.030	<0.030	<0.030	NM	NM	<0.030	<0.030	<0.030
	4/17/2003	<0.100	<0.100	<0.100	NM	NM	<0.100	<0.100	<0.100
	10/15/2003	<0.100	<0.100	<0.100	NM	NM	<0.100	<0.100	<0.100

## Summary of Groundwater Chemistry

Council Bluffs Construction and Demolition Landfill - 78-SDP-01-89

Parameter	Date	MW-2	MW-3	MW-4	MW-5	MW-7	MW-9	MW-10	MW-11
		DN1	UP1	UP2	UP1	UP2	DN1	DN2	DN1
Nitrogen, Ammonia - mg/L HAL - 30 mg/L	11/8/1996	NM	NM	NM	<0.200	<0.200	<0.200	<0.200	<0.200
	2/27/1997	<0.200	NM	NM	<0.200	<0.200	<0.200	<0.200	<0.200
	5/12/1997	NM	NM	NM	<0.200	<0.200	<0.200	<0.200	<0.200
	7/23/1997	NM	NM	NM	<0.200	<0.200	<0.200	<0.200	<0.200
	10/16/1997	NM	NM	NM	<0.200	<0.200	<0.200	<0.200	<0.200
	4/7/1998	<0.200	NM	NM	<0.200	<0.200	<0.200	<0.200	<0.200
	10/16/1998	<0.200	NM	NM	<0.200	<0.200	<0.200	<0.200	<0.200
	4/16/1999	<0.200	NM	NM	<0.200	<0.200	<0.200	<0.200	<0.200
	10/7/1999	<0.200	NM	NM	<0.200	<0.200	<0.200	NM	<0.200
	4/5/2000	<1.00	<1.00	<1.00	NM	NM	<1.00	NM	<1.00
	10/12/2000	<1.00	<1.00	<1.00	NM	NM	<1.00	<1.00	<1.00
	3/27/2001	<1.00	<1.00	<1.00	NM	NM	<1.00	NM	NM
	4/6/2001	NM	NM	NM	NM	NM	NM	<1.00	<1.00
	10/3/2001	<1.00	<1.00	<1.00	NM	NM	<1.00	<1.00	NM
	4/23/2002	<1.00	<1.00	<1.00	NM	NM	<1.00	<1.00	NM
	4/30/2002	NM	<1.00						
	10/3/2002	<1.00	<1.00	<1.00	NM	NM	<1.00	<1.00	<1.00
	4/17/2003	<0.200	<0.200	<0.200	NM	NM	<0.200	<0.200	<0.200
	10/15/2003	<0.200	<0.200	<0.200	NM	NM	<0.200	<0.200	<0.200
pH - S.U.	11/8/1996	NM	NM	NM	7.89	8.33	7.85	8.25	8.32
	2/27/1997	6.89	NM	NM	6.78	8.15	7.45	7.81	7.23
	5/12/1997	NM	NM	NM	6.82	6.52	6.47	7.40	7.45
	7/23/1997	NM	NM	NM	6.77	7.09	6.70	7.10	7.30
	10/16/1997	NM	NM	NM	7.51	7.26	7.60	7.93	7.96
	4/7/1998	7.32	NM	NM	7.60	7.35	7.78	8.07	8.21
	10/16/1998	7.57	NM	NM	7.64	7.13	7.64	8.03	8.11
	4/16/1999	7.88	NM	NM	7.91	7.36	7.84	7.35	7.22
	10/7/1999	7.10	NM	NM	7.08	6.96	6.90	NM	7.38
	4/5/2000	6.81	6.93	6.63	NM	NM	6.94	NM	7.11
	10/12/2000	6.43	6.95	6.60	NM	NM	6.50	6.37	6.40
	3/27/2001	7.37	7.85	7.91	NM	NM	7.87	7.40	7.53
	10/3/2001	8.18	7.86	8.03	NM	NM	8.64	7.78	NM
	4/23/2002	6.97	7.34	7.61	NM	NM	7.08	6.99	6.67
	10/3/2002	6.83	7.32	7.38	NM	NM	7.32	7.19	7.36
	4/17/2003	6.75	6.89	6.61	NM	NM	7.21	6.88	6.98
	10/15/2003	6.73	6.78	6.93	NM	NM	7.04	6.98	7.13
Specific Conductance - umhos/cm	11/8/1996	NM	NM	NM	660	660	900	760	790
	5/12/1997	NM	NM	NM	710	670	800	670	780
	7/23/1997	NM	NM	NM	2,510	1,140	2,090	2,460	2,070
	10/16/1997	NM	NM	NM	810	790	960	1,010	1,030
	4/7/1998	880	NM	NM	790	850	1,040	1,070	1,130
	10/16/1998	780	NM	NM	880	700	820	930	1,080
	4/16/1999	1,010	NM	NM	920	760	790	710	860
	10/7/1999	480	NM	NM	370	410	470	NM	460
	4/5/2000	1,630	1,060	820	NM	NM	640	NM	920
	10/12/2000	750	1,050	850	NM	NM	680	640	690
	3/27/2001	1,640	1,920	1,250	NM	NM	1,530	651	765
	4/6/2001	NM	NM	NM	NM	NM	NM	651	765
	10/3/2001	790	1,800	830	NM	NM	920	1,010	NM
	4/23/2002	810	1,287	631	NM	NM	658	686	697
	10/3/2002	688	988	526	NM	NM	576	582	599
	4/17/2003	845	1,209	711	NM	NM	621	685	780
	10/15/2003	513	872	493	NM	NM	521	574	541
Total Organic Halogens - mg/L	11/8/1996	NM	NM	NM	<0.010	<0.010	<0.010	<0.010	0.017
	10/16/1997	NM	NM	NM	<0.010	<0.010	<0.010	<0.010	<0.010
	4/7/1998	<0.010	NM						
	10/16/1998	<0.010	NM	NM	0.016	<0.010	0.018	0.001	0.013
	4/16/1999	<0.010	NM						
	10/7/1999	<0.010	NM	NM	<0.010	0.010	0.010	NM	<0.010
	10/12/2000	0.020	<0.010	0.030	NM	NM	<0.010	0.020	0.020
	10/3/2001	<0.010	<0.010	0.011	NM	NM	<0.010	0.010	NM
	10/3/2002	0.070	<0.010	0.026	NM	NM	0.020	0.135	0.143
	10/15/2003	<0.010	<0.010	<0.010	NM	NM	<0.010	0.013	<0.010
Total Phenols - mg/L HAL - 4 mg/L	11/8/1996	NM	NM	NM	<0.020	<0.020	<0.020	<0.020	<0.020
	10/16/1997	NM	NM	NM	0.050	<0.020	<0.020	<0.020	<0.020
	4/7/1998	<0.020	NM						
	10/16/1998	<0.020	NM	NM	<0.020	<0.020	<0.020	<0.020	<0.020
	4/16/1999	<0.020	NM						
	10/7/1999	<0.020	NM	NM	<0.020	<0.020	<0.020	NM	<0.020
	10/12/2000	<0.100	<0.100	<0.100	NM	NM	<0.100	<0.100	<0.100
	10/3/2001	<0.100	<0.100	<0.100	NM	NM	<0.100	<0.100	NM
	10/3/2002	<0.100	<0.100	<0.100	NM	NM	<0.100	<0.100	<0.100
	10/15/2003	<0.020	<0.020	<0.020	NM	NM	<0.020	<0.020	<0.020

## Summary of Groundwater Chemistry

Council Bluffs Construction and Demolition Landfill - 78-SDP-01-89

Parameter	Date	MW-2	MW-3	MW-4	MW-5	MW-7	MW-9	MW-10	MW-11
		DN1	UP1	UP2	UP1	UP2	DN1	DN2	DN1
Arsenic, Dissolved - mg/L MCL - 0.010 mg/L NRL - 0.00002 mg/L	11/8/1996	NM	NM	NM	<0.001	<0.001	<0.001	<0.001	0.002
	2/27/1997	<0.001	NM	NM	0.002	<0.001	<0.001	<0.001	<0.001
	5/12/1997	NM	NM	NM	0.002	0.001	<0.001	0.002	<0.001
	7/23/1997	NM	NM	NM	<0.001	<0.001	<0.001	0.003	<0.001
	10/16/1997	NM	NM	NM	0.001	NM	0.001	NM	NM
	4/7/1998	0.001	NM	NM	<0.001	<0.001	NM	<0.001	NM
	10/16/1998	<0.001	NM	NM	<0.001	<0.001	NM	<0.001	NM
	4/16/1999	<0.001	NM	NM	<0.001	<0.001	NM	<0.001	NM
	10/7/1999	0.001	NM	NM	NM	NM	NM	NM	NM
	4/5/2000	0.002	NM	NM	NM	NM	NM	NM	NM
	10/12/2000	0.004	NM	NM	NM	NM	NM	NM	NM
	3/27/2001	0.005	NM	NM	NM	NM	NM	NM	NM
	10/3/2001	0.003	NM	NM	NM	NM	NM	NM	NM
	4/23/2002	0.002	NM	NM	NM	NM	NM	NM	NM
	10/3/2002	0.005	NM	NM	NM	NM	NM	NM	NM
Barium, Dissolved - mg/L MCL - 2 mg/L HAL - 2 mg/L	4/17/2003	0.002	<0.001	NM	NM	NM	NM	NM	NM
	10/15/2003	0.002	<0.001	NM	NM	NM	NM	NM	NM
	11/8/1996	NM	NM	NM	0.423	0.272	0.236	0.362	0.168
	2/27/1997	0.339	NM	NM	0.301	0.255	0.216	0.385	0.139
	5/12/1997	NM	NM	NM	0.261	0.238	0.211	0.145	0.151
	7/23/1997	NM	NM	NM	0.265	0.242	0.204	0.154	0.144
	4/7/1998	0.274	NM	NM	NM	NM	NM	NM	NM
	10/16/1998	0.183	NM	NM	NM	NM	NM	NM	NM
	4/16/1999	0.280	NM	NM	NM	NM	NM	NM	NM
	10/7/1999	0.727	NM	NM	NM	NM	NM	NM	NM
Benzene - ug/L MCL - 5 ug/L NRL - 1 ug/L	11/8/1996	NM	NM	NM	<1.0	<1.0	<1.0	<1.0	<1.0
	2/27/1997	<0.5	NM	NM	<0.5	<0.5	<0.5	<0.5	<0.5
	5/12/1997	NM	NM	NM	<0.5	<0.5	<0.5	<0.5	<0.5
	7/23/1997	NM	NM	NM	<0.5	<0.5	<0.5	<0.5	<0.5
	4/7/1998	<0.5	NM	NM	NM	NM	NM	NM	NM
	10/16/1998	<0.5	NM	NM	NM	NM	NM	NM	NM
	4/16/1999	<0.5	NM	NM	NM	NM	NM	NM	NM
	10/7/1999	<0.5	NM	NM	NM	NM	NM	NM	NM
	11/8/1996	NM	NM	NM	<0.001	<0.001	<0.001	<0.001	<0.001
	2/27/1997	<0.001	NM	NM	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium, Dissolved - mg/L MCL - 0.005 mg/L HAL - 0.005 mg/L	5/12/1997	NM	NM	NM	<0.001	<0.001	0.001	<0.001	<0.001
	7/23/1997	NM	NM	NM	<0.001	<0.001	0.003	<0.001	<0.001
	4/7/1998	<0.001	NM	NM	NM	NM	NM	NM	NM
	10/16/1998	<0.001	NM	NM	NM	NM	NM	NM	NM
	4/16/1999	0.001	NM	NM	NM	NM	NM	NM	NM
	10/7/1999	<0.001	NM	NM	NM	NM	NM	NM	NM
	11/8/1996	NM	NM	NM	<0.3	<0.3	<0.3	<0.3	<0.3
	2/27/1997	<0.3	NM	NM	<0.3	<0.3	<0.3	<0.3	<0.3
	5/12/1997	NM	NM	NM	<0.3	<0.3	<0.3	<0.3	<0.3
	7/23/1997	NM	NM	NM	<0.3	<0.3	<0.3	<0.3	<0.3
Carbon Tetrachloride - ug/L MCL - 5.0 ug/L NRL - 0.3 ug/L	4/7/1998	<0.3	NM	NM	NM	NM	NM	NM	NM
	10/16/1998	<0.3	NM	NM	NM	NM	NM	NM	NM
	4/16/1999	<0.3	NM	NM	NM	NM	NM	NM	NM
	10/7/1999	<0.3	NM	NM	NM	NM	NM	NM	NM
	11/8/1996	NM	NM	NM	<0.002	<0.002	0.002	0.007	0.008
	2/27/1997	<0.002	NM	NM	0.004	0.007	0.004	0.008	0.008
	5/12/1997	NM	NM	NM	0.003	0.007	0.004	<0.002	0.007
	7/23/1997	NM	NM	NM	0.002	0.007	0.003	<0.002	0.006
	4/7/1998	<0.002	NM	NM	NM	NM	NM	NM	NM
	10/16/1998	0.003	NM	NM	NM	NM	NM	NM	NM
Chromium, Dissolved - mg/L MCL - 0.1 mg/L HAL - 0.1 mg/L	4/16/1999	<0.002	NM	NM	NM	NM	NM	NM	NM
	10/7/1999	<0.002	NM	NM	NM	NM	NM	NM	NM
	11/8/1996	NM	NM	NM	<0.020	<0.020	<0.020	<0.020	<0.020
	2/27/1997	<0.020	NM	NM	<0.020	<0.020	<0.020	<0.020	<0.020
	5/12/1997	NM	NM	NM	<0.050	<0.050	<0.050	<0.050	<0.050
	7/23/1997	NM	NM	NM	<0.020	<0.020	<0.020	<0.020	<0.020
	4/7/1998	<0.020	NM	NM	NM	NM	NM	NM	NM
	10/16/1998	<0.020	NM	NM	NM	NM	NM	NM	NM
	4/16/1999	<0.020	NM	NM	NM	NM	NM	NM	NM
	10/7/1999	<0.020	NM	NM	NM	NM	NM	NM	NM
Copper, Dissolved - mg/L MCL - 1.3 mg/L	11/8/1996	NM	NM	NM	<0.020	<0.020	<0.020	<0.020	<0.020
	2/27/1997	<0.020	NM	NM	<0.020	<0.020	<0.020	<0.020	<0.020
	5/12/1997	NM	NM	NM	<0.050	<0.050	<0.050	<0.050	<0.050
	7/23/1997	NM	NM	NM	<0.020	<0.020	<0.020	<0.020	<0.020
	4/7/1998	<0.020	NM	NM	NM	NM	NM	NM	NM
	10/16/1998	<0.020	NM	NM	NM	NM	NM	NM	NM
	4/16/1999	<0.020	NM	NM	NM	NM	NM	NM	NM
	10/7/1999	<0.020	NM	NM	NM	NM	NM	NM	NM
	11/8/1996	NM	NM	NM	<0.005	<0.005	<0.005	<0.005	<0.005
	2/27/1997	<0.005	NM	NM	<0.005	<0.005	<0.005	<0.005	<0.005
Lead, Dissolved - mg/L MCL - 0.015 mg/L	5/12/1997	NM	NM	NM	<0.005	<0.005	<0.005	<0.005	<0.005
	7/23/1997	NM	NM	NM	<0.004	<0.004	<0.004	<0.004	<0.004
	4/7/1998	<0.004	NM	NM	NM	NM	NM	NM	NM
	10/16/1998	<0.004	NM	NM	NM	NM	NM	NM	NM
	4/16/1999	<0.004	NM	NM	NM	NM	NM	NM	NM
	10/7/1999	<0.004	NM	NM	NM	NM	NM	NM	NM

## Summary of Groundwater Chemistry

Council Bluffs Construction and Demolition Landfill - 78-SDP-01-89

Parameter	Date	MW-2	MW-3	MW-4	MW-5	MW-7	MW-9	MW-10	MW-11
		DN1	UP1	UP2	UP1	UP2	DN1	DN2	DN1
Magnesium, Dissolved - mg/L	11/8/1996	NM	NM	NM	64.0	22.0	38.0	22.0	29.0
	2/27/1997	45.0	NM	NM	75.0	24.0	39.0	25.0	28.0
	5/12/1997	NM	NM	NM	71.0	23.0	38.0	21.0	29.0
	7/23/1997	NM	NM	NM	69.0	22.0	37.0	22.0	27.0
	4/7/1998	34.0	NM	NM	NM	NM	NM	NM	NM
	10/16/1998	30.0	NM	NM	NM	NM	NM	NM	NM
	4/16/1999	42.0	NM	NM	NM	NM	NM	NM	NM
	10/7/1999	56.0	NM	NM	NM	NM	NM	NM	NM
Mercury, Dissolved - mg/L MCL - 0.002 mg/L	11/8/1996	NM	NM	NM	<0.000	<0.000	<0.000	<0.000	<0.000
	2/27/1997	<0.000	NM	NM	<0.000	0.001	0.001	0.001	0.001
	5/12/1997	NM	NM	NM	<0.000	<0.000	<0.000	<0.000	<0.000
	7/23/1997	NM	NM	NM	<0.000	<0.000	<0.000	<0.000	<0.000
	4/7/1998	<0.000	NM	NM	NM	NM	NM	NM	NM
	10/16/1998	<0.000	NM	NM	NM	NM	NM	NM	NM
	4/16/1999	<0.000	NM	NM	NM	NM	NM	NM	NM
	10/7/1999	<0.000	NM	NM	NM	NM	NM	NM	NM
Trichloroethylene - ug/L MCL - 5 ug/L NRL - 3 ug/L	11/8/1996	NM	NM	NM	<1.0	<1.0	<1.0	<1.0	<1.0
	2/27/1997	<1.0	NM	NM	<1.0	<1.0	<1.0	<1.0	<1.0
	5/12/1997	NM	NM	NM	<1.0	<1.0	<1.0	<1.0	<1.0
	7/23/1997	NM	NM	NM	<1.0	<1.0	<1.0	<1.0	<1.0
	4/7/1998	<1.0	NM	NM	NM	NM	NM	NM	NM
	10/16/1998	<1.0	NM	NM	NM	NM	NM	NM	NM
	4/16/1999	<1.0	NM	NM	NM	NM	NM	NM	NM
	10/7/1999	<1.0	NM	NM	NM	NM	NM	NM	NM
Zinc, Dissolved - mg/L	11/8/1996	NM	NM	NM	<0.020	<0.020	<0.020	<0.020	<0.020
	2/27/1997	<0.020	NM	NM	<0.020	<0.020	<0.020	<0.020	<0.020
	5/12/1997	NM	NM	NM	<0.050	<0.050	<0.050	<0.050	<0.050
	7/23/1997	NM	NM	NM	0.071	<0.020	<0.020	<0.020	<0.020
	4/7/1998	<0.020	NM	NM	NM	NM	NM	NM	NM
	10/16/1998	<0.020	NM	NM	NM	NM	NM	NM	NM
	4/16/1999	<0.020	NM	NM	NM	NM	NM	NM	NM
	10/7/1999	0.145	NM	NM	NM	NM	NM	NM	NM
1,1,1-Trichloroethane - ug/L MCL - 200 ug/L HAL - 200 ug/L	11/8/1996	NM	NM	NM	<1.0	<1.0	<1.0	<1.0	<1.0
	2/27/1997	<1.0	NM	NM	<1.0	<1.0	<1.0	<1.0	<1.0
	5/12/1997	NM	NM	NM	<1.0	<1.0	<1.0	<1.0	<1.0
	7/23/1997	NM	NM	NM	<1.0	<1.0	<1.0	<1.0	<1.0
	4/7/1998	<1.0	NM	NM	NM	NM	NM	NM	NM
	10/16/1998	<1.0	NM	NM	NM	NM	NM	NM	NM
	4/16/1999	<1.0	NM	NM	NM	NM	NM	NM	NM
	10/7/1999	<1.0	NM	NM	NM	NM	NM	NM	NM
1,1-Dichloroethene - ug/L	11/8/1996	NM	NM	NM	<1.0	<1.0	<1.0	<1.0	<1.0
	2/27/1997	<2.0	NM	NM	<2.0	<2.0	<2.0	<2.0	<2.0
	5/12/1997	NM	NM	NM	<2.0	<2.0	<2.0	<2.0	<2.0
	7/23/1997	NM	NM	NM	<2.0	<2.0	<2.0	<2.0	<2.0
	4/7/1998	<2.0	NM	NM	NM	NM	NM	NM	NM
	10/16/1998	<2.0	NM	NM	NM	NM	NM	NM	NM
	4/16/1999	<2.0	NM	NM	NM	NM	NM	NM	NM
	10/7/1999	<2.0	NM	NM	NM	NM	NM	NM	NM
1,2-Dichloroethane - ug/L MCL - 5 ug/L NRL - 0.4 ug/L	11/8/1996	NM	NM	NM	<0.4	<0.4	<0.4	<0.4	<0.4
	2/27/1997	<0.4	NM	NM	<0.4	<0.4	<0.4	<0.4	<0.4
	5/12/1997	NM	NM	NM	<0.4	<0.4	<0.4	<0.4	<0.4
	7/23/1997	NM	NM	NM	<0.4	<0.4	<0.4	<0.4	<0.4
	4/7/1998	<0.4	NM	NM	NM	NM	NM	NM	NM
	10/16/1998	<0.4	NM	NM	NM	NM	NM	NM	NM
	4/16/1999	<0.4	NM	NM	NM	NM	NM	NM	NM
	10/7/1999	<0.4	NM	NM	NM	NM	NM	NM	NM
1,4-Dichlorobenzene - ug/L MCL - 75 ug/L HAL - 75 ug/L	11/8/1996	NM	NM	NM	<1.0	<1.0	<1.0	<1.0	<1.0
	2/27/1997	<1.0	NM	NM	<1.0	<1.0	<1.0	<1.0	<1.0
	5/12/1997	NM	NM	NM	<1.0	<1.0	<1.0	<1.0	<1.0
	7/23/1997	NM	NM	NM	<1.0	<1.0	<1.0	<1.0	<1.0
	4/7/1998	<1.0	NM	NM	NM	NM	NM	NM	NM
	10/16/1998	<1.0	NM	NM	NM	NM	NM	NM	NM
	4/16/1999	<1.0	NM	NM	NM	NM	NM	NM	NM
	10/7/1999	<1.0	NM	NM	NM	NM	NM	NM	NM

Notes:

NM - Parameter was not measured

< - Less than the Method Detection Limit (MDL)

ug/L - Micrograms per liter, equivalent to parts per billion at low concentrations

mg/L - Milligrams per liter, equivalent to parts per million at low concentrations

USEPA HAL - United States Environmental Protection Agency Health Advisory Level

USEPA NRL - United States Environmental Protection Agency Negligible Risk Level for Carcinogens

USEPA MCL - United States Environmental Protection Agency Maximum Contaminant Level

**APPENDIX C**  
**ANALYTICAL DATA**

## ANALYTICAL REPORT

Debra Stephens  
BARKER, LEMAR & ASSOCIATES  
1300 Cummins Road, #201  
Des Moines, IA 50315

**RECEIVED**

NOV 03 2003 Sample No.: 764695

10/31/2003

Job No: 03.14076

Sample ID: MW-2  
ANDEX 03001  
ANDERSON EXCAVATING

Date Taken:	10/15/2003	Date Received:		10/17/2003	Quantitation	Date Analyzed	Time Analyzed	Analyst	Analysis Method
		Result	Units	Flags	Limit				
Chloride, FIA	<5.0	mg/L			5.0	10/21/2003	13:42	lbb	SM 4500-Cl E
COD, Block Digester (LL)	<5.0	mg/L			5.0	10/21/2003		jcf	SM 5220 D
Ammonia Nitrogen FIA	<0.20	mg/L			0.20	10/20/2003	13:22	jcf	EPA 350.1
Phenols, Total (FIA)	<0.020	mg/L			0.020	10/23/2003	15:33	mdk	EPA 420.2
Total Organic Halogens	<0.010	mg/L Cl-			0.010	10/22/2003		tlz	SW 9020B
Dissolved ICP Metals	COMPLETE						10/29/2003	heh	
Iron, Dissolved (ICP)	<0.10	mg/L			0.10	10/29/2003		heh	SW 6010B
Arsenic, Diss (GFAA)	0.0024	mg/L			0.0010	10/21/2003		llw	SW 7060A

Key to Flags:

*Kristin Clay*  
Kristin M. Clay  
Operations Manager  
Iowa Lab Certification - 7

## ANALYTICAL REPORT

Debra Stephens  
BARKER, LEMAR & ASSOCIATES  
1300 Cummins Road, #201  
Des Moines, IA 50315

10/31/2003

Sample No.: 764696

Job No: 03.14076

Sample ID: MW-3  
ANDEX 03001  
ANDERSON EXCAVATING

Date Taken:	10/15/2003	Date Received:		10/17/2003	Quantitation	Date Analyzed	Time Analyzed	Analyst	Analysis Method
		Result	Units	Flags	Limit				
Chloride, FIA	52.3	mg/L			5.0	10/21/2003	13:45	lbb	SM 4500-C1 E
COD, Block Digester (LL)	<5.0	mg/L			5.0	10/21/2003		jcf	SM 5220 D
Ammonia Nitrogen FIA	<0.20	mg/L			0.20	10/20/2003	13:22	jcf	EPA 350.1
Phenols, Total(FIA)	<0.020	mg/L			0.020	10/23/2003	15:34	mdk	EPA 420.2
Total Organic Halogens	<0.010	mg/L Cl-			0.010	10/22/2003		tlz	SW 9020B
Dissolved ICP Metals	COMPLETE					10/29/2003	18:01	heh	
Iron, Dissolved (ICP)	<0.10	mg/L			0.10	10/29/2003	18:01	heh	SW 6010B
Arsenic, Diss (GFAA)	<0.0010	mg/L			0.0010	10/21/2003		llw	SW 7060A

Key to Flags:

*Kristin Clay*  
Kristin M. Clay  
Operations Manager  
Iowa Lab Certification - 7

## ANALYTICAL REPORT

Debra Stephens  
BARKER, LEMAR & ASSOCIATES  
1300 Cummins Road, #201  
Des Moines, IA 50315

10/31/2003

Sample No.: 764697

Job No: 03.14076

Sample ID: MW-4  
ANDEX 03001  
ANDERSON EXCAVATING

Date Taken:	10/15/2003	Date Received:		10/17/2003	Quantitation	Date Analyzed	Time Analyzed	Analyst	Analysis Method
		Result	Units	Flags	Limit				
Chloride, FIA	5.3	mg/L			5.0	10/21/2003	13:46	lbb	SM 4500-Cl E
COD, Block Digester (LL)	<5.0	mg/L			5.0	10/21/2003		jcf	SM 5220 D
Ammonia Nitrogen FIA	<0.20	mg/L			0.20	10/20/2003	13:23	jcf	EPA 350.1
Phenols, Total (FIA)	<0.020	mg/L			0.020	10/23/2003	15:35	mdk	EPA 420.2
Total Organic Halogens	<0.010	mg/L Cl-			0.010	10/22/2003		tlz	SW 9020B
Dissolved ICP Metals	COMPLETE						10:29/2003	heh	
Iron, Dissolved (ICP)	<0.10	mg/L			0.10	10/29/2003	18:11	heh	SW 6010B

Key to Flags:

*Kristin Clay*  
Kristin M. Clay  
Operations Manager  
Iowa Lab Certification - 7

## ANALYTICAL REPORT

Debra Stephens  
BARKER, LEMAR & ASSOCIATES  
1300 Cummins Road, #201  
Des Moines, IA 50315

10/31/2003

Sample No.: 764698

Job No: 03.14076

Sample ID: MW-9  
ANDEX 03001  
ANDERSON EXCAVATING

Date Taken:	10/15/2003	Date Received:		10/17/2003	Quantitation	Date Analyzed	Time Analyzed	Analyst	Analysis Method
		Result	Units	Flags	Limit				
Chloride, FIA	7.8	mg/L			5.0	10/21/2003	13:48	lbb	SM 4500-Cl E
COD, Block Digester (LL)	<5.0	mg/L			5.0	10/21/2003		jcf	SM 5220 D
Ammonia Nitrogen FIA	<0.20	mg/L			0.20	10/20/2003	13:24	jcf	EPA 350.1
Phenols, Total (FIA)	<0.020	mg/L			0.020	10/23/2003	15:36	mdk	EPA 420.2
Total Organic Halogens	<0.010	mg/L Cl-			0.010	10/22/2003		tlz	SW 9020B
Dissolved ICP Metals	COMPLETE					10/29/2003	18:15	heh	
Iron, Dissolved (ICP)	<0.10	mg/L			0.10	10/29/2003	18:15	heh	SW 6010B

Key to Flags:

*Kristin Clay*  
Kristin M. Clay  
Operations Manager  
Iowa Lab Certification - 7

## ANALYTICAL REPORT

Debra Stephens  
BARKER, LEMAR & ASSOCIATES  
1300 Cummins Road, #201  
Des Moines, IA 50315

10/31/2003

Sample No.: 764699

Job No: 03.14076

Sample ID: MW-10  
ANDEX 03001  
ANDERSON EXCAVATING

Date Taken:	10/15/2003	Date Received:		10/17/2003	Quantitation	Date Analyzed	Time Analyzed	Analyst	Analysis Method
		Result	Units	Flags	Limit				
Chloride, FIA	35.2	mg/L			5.0	10/21/2003	13:49	lbb	SM 4500-Cl E
COD, Block Digester (LL)	<5.0	mg/L			5.0	10/21/2003		jcf	SM 5220 D
Ammonia Nitrogen FIA	<0.20	mg/L			0.20	10/20/2003	13:25	jcf	EPA 350.1
Phenols, Total (FIA)	<0.020	mg/L			0.020	10/23/2003	15:36	mdk	EPA 420.2
Total Organic Halogens	0.013	mg/L Cl-			0.010	10/23/2003		sas	SW 9020B
Dissolved ICP Metals	COMPLETE					10/29/2003	18:20	heh	
Iron, Dissolved (ICP)	<0.10	mg/L			0.10	10/29/2003	18:20	heh	SW 6010B

Key to Flags:

*Kristin Clay*  
Kristin M. Clay  
Operations Manager  
Iowa Lab Certification - 7

## ANALYTICAL REPORT

Debra Stephens  
BARKER, LEMAR & ASSOCIATES  
1300 Cummins Road, #201  
Des Moines, IA 50315

10/31/2003

Sample No.: 764700

Job No: 03.14076

Sample ID: MW-11  
ANDEX 03001  
ANDERSON EXCAVATING

Date Taken:	10/15/2003	Date Received:		10/17/2003	Quantitation	Date Analyzed	Time Analyzed	Analyst	Analysis Method
		Result	Units	Flags	Limit				
Chloride, FIA	9.1	mg/L			5.0	10/21/2003	13:50	lbb	SM 4500-Cl E
COD, Block Digester (LL)	<5.0	mg/L			5.0	10/21/2003		jcf	SM 5220 D
Ammonia Nitrogen FIA	<0.20	mg/L			0.20	10/20/2003	13:26	jcf	EPA 350.1
Phenols, Total(FIA)	<0.020	mg/L			0.020	10/23/2003	15:37	mdk	EPA 420.2
Total Organic Halogens	<0.010	mg/L Cl-			0.010	10/23/2003		sas	SW 9020B
Dissolved ICP Metals	COMPLETE					10/29/2003	18:25	neh	
Iron, Dissolved (ICP)	<0.10	mg/L			0.10	10/29/2003	18:25	neh	SW 6010B

Key to Flags:



Kristin M. Clay  
Operations Manager  
Iowa Lab Certification - 7

## QUALITY CONTROL REPORT

BARKER, LEMAR & ASSOCIATES  
1300 Cummins Road, #201  
Des Moines, IA 50315

10/31/2003

Job Number: 03.14076

Debra Stephens

Enclosed is the Quality Control data for the following samples submitted to TestAmerica, Inc. - Cedar Falls for analysis:

Sample Number	Sample Description	Date Taken	Date Received
764695	MW-2	10/15/2003	10/17/2003
764696	MW-3	10/15/2003	10/17/2003
764697	MW-4	10/15/2003	10/17/2003
764698	MW-9	10/15/2003	10/17/2003
764699	MW-10	10/15/2003	10/17/2003
764700	MW-11	10/15/2003	10/17/2003

This Quality Control report is generated on a batch basis. All information contained in this report is for the analytical batch(es) in which your sample(s) were analyzed.

## QUALITY CONTROL REPORT

BARKER, LEMAR & ASSOCIATES  
1300 Cummins Road, #201  
Des Moines, IA 50315

10/31/2003

Debra Stephens

Job Number: 03.14076

			Prep Date Analyzed	Run Batch Number		Reporting Limit
764695	MW-2				10/15/2003	
Chloride, FIA	<5.0	mg/L	10/21/2003	919	SM 4500-Cl E	5.0
COD, Block Digester (LL)	<5.0	mg/L	10/21/2003	607	SM 5220 D	5.0
Ammonia Nitrogen FIA	<0.20	mg/L	10/20/2003	476	EPA 350.1	0.20
Phenols, Total(FIA)	<0.020	mg/L	10/23/2003	1305	EPA 420.2	0.020
Total Organic Halogens	<0.010	mg/L Cl-	10/22/2003	1256	SW 9020B	0.010
Dissolved ICP Metals	COMPLETE		10/29/2003	1506		
Iron, Dissolved (ICP)	<0.10	mg/L	10/29/2003	1471	SW 6010B	0.10
Arsenic, Diss (GFAA)	0.0024	mg/L	10/21/2003	951	SW 7060A	0.0010
764696	MW-3				10/15/2003	
Chloride, FIA	52.3	mg/L	10/21/2003	919	SM 4500-Cl E	5.0
COD, Block Digester (LL)	<5.0	mg/L	10/21/2003	607	SM 5220 D	5.0
Ammonia Nitrogen FIA	<0.20	mg/L	10/20/2003	476	EPA 350.1	0.20
Phenols, Total(FIA)	<0.020	mg/L	10/23/2003	1305	EPA 420.2	0.020
Total Organic Halogens	<0.010	mg/L Cl-	10/22/2003	1256	SW 9020B	0.010
Dissolved ICP Metals	COMPLETE		10/29/2003	1506		
Iron, Dissolved (ICP)	<0.10	mg/L	10/29/2003	1471	SW 6010B	0.10
Arsenic, Diss (GFAA)	<0.0010	mg/L	10/21/2003	951	SW 7060A	0.0010
764697	MW-4				10/15/2003	
Chloride, FIA	5.3	mg/L	10/21/2003	920	SM 4500-Cl E	5.0
COD, Block Digester (LL)	<5.0	mg/L	10/21/2003	607	SM 5220 D	5.0
Ammonia Nitrogen FIA	<0.20	mg/L	10/20/2003	476	EPA 350.1	0.20
Phenols, Total(FIA)	<0.020	mg/L	10/23/2003	1305	EPA 420.2	0.020
Total Organic Halogens	<0.010	mg/L Cl-	10/22/2003	1256	SW 9020B	0.010
Dissolved ICP Metals	COMPLETE		10/29/2003	1506		
Iron, Dissolved (ICP)	<0.10	mg/L	10/29/2003	1471	SW 6010B	0.10

## QUALITY CONTROL REPORT

BARKER, LEMAR & ASSOCIATES  
1300 Cummins Road, #201  
Des Moines, IA 50315

10/31/2003

Debra Stephens

Job Number: 03.14076

		Prep Date Analyzed	Run Batch Number		Reporting Limit
--	--	--------------------	------------------	--	-----------------

764698 MW-9

10/15/2003

Chloride, FIA	7.8	mg/L	10/21/2003	920	SM 4500-Cl E	5.0
COD, Block Digester (LL)	<5.0	mg/L	10/21/2003	607	SM 5220 D	5.0
Ammonia Nitrogen FIA	<0.20	mg/L	10/20/2003	476	EPA 350.1	0.20
Phenols, Total(FIA)	<0.020	mg/L	10/23/2003	1305	EPA 420.2	0.020
Total Organic Halogens	<0.010	mg/L Cl-	10/22/2003	1256	SW 9020B	0.010
Dissolved ICP Metals	COMPLETE		10/29/2003	1506		
Iron, Dissolved (ICP)	<0.10	mg/L	10/29/2003	1471	SW 6010B	0.10

764699 MW-10

10/15/2003

Chloride, FIA	35.2	mg/L	10/21/2003	920	SM 4500-Cl E	5.0
COD, Block Digester (LL)	<5.0	mg/L	10/21/2003	607	SM 5220 D	5.0
Ammonia Nitrogen FIA	<0.20	mg/L	10/20/2003	476	EPA 350.1	0.20
Phenols, Total(FIA)	<0.020	mg/L	10/23/2003	1305	EPA 420.2	0.020
Total Organic Halogens	0.013	mg/L Cl-	10/23/2003	1256	SW 9020B	0.010
Dissolved ICP Metals	COMPLETE		10/29/2003	1506		
Iron, Dissolved (ICP)	<0.10	mg/L	10/29/2003	1471	SW 6010B	0.10

764700 MW-11

10/15/2003

Chloride, FIA	9.1	mg/L	10/21/2003	920	SM 4500-Cl E	5.0
COD, Block Digester (LL)	<5.0	mg/L	10/21/2003	607	SM 5220 D	5.0
Ammonia Nitrogen FIA	<0.20	mg/L	10/20/2003	476	EPA 350.1	0.20
Phenols, Total(FIA)	<0.020	mg/L	10/23/2003	1305	EPA 420.2	0.020
Total Organic Halogens	<0.010	mg/L Cl-	10/23/2003	1256	SW 9020B	0.010
Dissolved ICP Metals	COMPLETE		10/29/2003	1506		
Iron, Dissolved (ICP)	<0.10	mg/L	10/29/2003	1471	SW 6010B	0.10

## QUALITY CONTROL REPORT BLANKS

BARKER, LEMAR & ASSOCIATES  
1300 Cummins Road, #201  
Des Moines, IA 50315

10/31/2003

Debra Stephens

Job Number: 03.14076

Analyte	Prep	Run		Date	Analyst
	Batch Number	Batch Number	Blank Analysis		
Chloride, FIA		919	<5.0	mg/L	10/21/2003
Chloride, FIA		920	<5.0	mg/L	10/21/2003
COD, Block Digester (LL)		607	<5.0	mg/L	10/21/2003
Ammonia Nitrogen FIA		476	<0.20	mg/L	10/20/2003
Phenols, Total (FIA)		1305	<0.020	mg/L	10/23/2003
Total Organic Halogens		1256	<0.010	mg/L	10/22/2003
Total Organic Halogens		1256	<0.010	mg/L	10/23/2003
Total Organic Halogens		1256	<0.010	mg/L	10/24/2003
Total Organic Halogens		1256	<0.010	mg/L	10/25/2003
Dissolved ICP Metals		1506	COMPLETE		heh
Iron, Dissolved (ICP)		1471	<0.10	mg/L	10/29/2003
Arsenic, Diss (GFAA)		951	<0.0010	mg/L	10/21/2003

NA - Not Applicable

### Advisory Control Limits for Blanks:

Metals/Wet Chemistry/ Conventional/GC - all compounds should be less than the Reporting Limit.

GC/MS - Semi-Volatiles - all compounds should be less than the Reporting Limit except for phthalates which should be less than 5 times the reporting limit.

Volatiles - Toluene, methylene chloride, acetone and chloroform should be less than 5 times the Reporting Limit. All other volatile compounds should be less than the Reporting Limit.

## QUALITY CONTROL REPORT STANDARDS

BARKER, LEMAR & ASSOCIATES  
1300 Cummins Road, #201  
Des Moines, IA 50315

10/31/2003

Debra Stephens

Job Number: 03.14076

Prep	Run			
Analyte	Batch	Batch	CCV	LCS
	Number	Number	% Recovery	% Recovery
Chloride, FIA		919	100.0	
Chloride, FIA		919	96.4	
Chloride, FIA		919	96.8	
Chloride, FIA		919	94.5	
Chloride, FIA		919	93.0	
Chloride, FIA		919	94.0	
Chloride, FIA		920	99.2	
Chloride, FIA		920	93.5	
COD, Block Digester (LL)		607	104.4	
COD, Block Digester (LL)		607	99.1	
COD, Block Digester (LL)		607	102.0	
COD, Block Digester (LL)		607	99.6	
Ammonia Nitrogen FIA		476	95.4	
Ammonia Nitrogen FIA		476	93.0	
Ammonia Nitrogen FIA		476	95.6	
Ammonia Nitrogen FIA		476	93.3	
Ammonia Nitrogen FIA		476	92.0	
Ammonia Nitrogen FIA		476	94.0	
Phenols, Total(FIA)		1305	96.0	94.0
Phenols, Total(FIA)		1305	97.0	mdk
Phenols, Total(FIA)		1305	50.0	
Phenols, Total(FIA)		1305	100.2	
Total Organic Halogens		1256	98.8	80.0
Total Organic Halogens		1256	99.0	sas
Total Organic Halogens		1256	99.4	
Dissolved ICP Metals		1506		
Iron, Dissolved (ICP)		1471	102.6	
Iron, Dissolved (ICP)		1471	101.2	
Iron, Dissolved (ICP)		1471	101.2	
Arsenic, Diss (GFAA)		951	100.4	
Arsenic, Diss (GFAA)		951	98.7	

CCV - Continuing Calibration Verification

LCS - Laboratory Control Standard

NA - Not Applicable

## QUALITY CONTROL REPORT DUPLICATES/SPIKES

BARKER, LEMAR & ASSOCIATES  
1300 Cummins Road, #201  
Des Moines, IA 50315

10/31/2003

Debra Stephens

Job Number: 03.14076

Analyte	Prep Batch Number	Run Batch Number	Original Analysis	Duplicate Analysis	Units	RPD	Spike Result	Units	Percent Recovery
Dissolved ICP Metals		1506	COMPLETE				COMPLETE		
Iron, Dissolved (ICP)		1471	<0.10	<0.10	mg/L		1.92	mg/L	100.0
Iron, Dissolved (ICP)		1471	<0.10	<0.10	mg/L		1.88	mg/L	97.9
Arsenic, Diss (GFAA)		951	<0.0010	<0.0010	mg/L		0.0262	mg/L	108.8

NOTE: Spikes and Duplicates may not be samples from this job.

NA - Not Applicable

RPD - Relative Percent Difference

Advisory Control Limits for Duplicates - RPD should be less than 20.

Advisory Control Limits for Spikes - Spike recovery should be 75 - 125%.

**QUALITY CONTROL REPORT  
MATRIX SPIKE/MATRIX SPIKE DUPLICATE**

BARKER, LEMAR & ASSOCIATES  
1300 Cummins Road, #201  
Des Moines, IA 50315

10/31/2003

Debra Stephens

Job Number: 03.14076

Analyte	Prep	Run	Batch Number	Batch Number	Analysis Result	Units	MS Result	MS % Recovery	MSD Result	MSD % Recovery	MS/MSD RPD
	Number	Result									
Chloride, FIA		919			14.5	mg/L	39.9	101.6	39.7	100.8	0.5
Chloride, FIA		920			5.3	mg/L	29.6	97.2	29.0	94.8	2.0
COD, Block Digester (LL)		607			<5.0	mg/L	151.0	100.7	149.4	99.6	1.1
Ammonia Nitrogen FIA		476			0.51	mg/L	9.1	85.9	9.1	85.9	0.0
Phenols, Total(FIA)		1305			<0.020	mg/L	0.097	97.0	0.100	100.0	3.0
Total Organic Halogens		1256			<0.010	mg/L C	0.09897	99.0	0.10449	104.5	5.4

NOTE: Matrix Spike Samples may not be samples from this job.

NA = Not Applicable

MS = Matrix Spike

MSD = Matrix Spike Duplicate

RPD = Relative Percent Difference

Page 14 of 14

TestAmerica Job Number: 03.14076

#### ATTACHMENTS

Following are the sample receipt log and the chain of custody applicable to this analytical report.

Any abnormalities or departures from sample acceptance policy shall be documented on the "Sample Receipt and Temperature Log Form" and Sample Non-Conformance Form" (if applicable) included with this report.

For information concerning certifications of this facility or another TestAmerica facility please visit our website at [www.TestAmericaInc.com](http://www.TestAmericaInc.com).

This data has been produced in compliance with 2001 NELAC Standards (July 2003), except where noted.

This report shall not be reproduced, except in full, without written approval of the laboratory.

*For questions regarding this report, please contact the individual who signed the analytical report.*

Test America

Incorporated

704 Enterprise Drive  
Cedar Falls, Iowa 50613

**Phone:** 319-277-2401                          **or**                          1-800-750-2401  
**Fax:** 515-792-7989

or 1-800-750-2401

SAMPLER: Barker Lemar Engineering Consultants

---

SITE NAME: Anderson Excavating & Wrecking, Council Bluffs C&D Landfill

ADDRESS: 1300 Cummins Road Suite 201

CITY/STATE/ZIP: Des Moines, IA 50315

**TELEPHONE NUMBER: 515-256-8814** **Fax: 515-256-0152**

SAMPLED BY: (PRINT NAME) Mike Martin

**REPORT TO:**

NAME: Debra Stephens

**COMPANY NAME:** Barker Lemar Engineering Consultants

**PROJECT NAME:** Anderson Excavating & Wrecking, Council Bluffs C&D Landfill (October)

**PROJECT NUMBER:** ANDEX 03001

**ADDRESS:** 1300 Cummins Road Suite 201

CITY/STATE/ZIP: Des Moines, IA 50315

**LABORATORY WORK ORDER NO.**

Sample ID	Date Sampled	Time Sampled	# of Containers Shipped	Grab	Composite	Field Filtered	Preservative				Matrix				Analyze For:				Standard TAT	Fax Results	LABORATORY SAMPLE NUMBER		
							Ice	HNO <sub>3</sub> (Red & White Label)	HCl (Blue & White Label)	NaOH (Orange & White Label)	H <sub>2</sub> SO <sub>4</sub> , Plastic (Yellow & White Label)	H <sub>2</sub> SO <sub>4</sub> , Glass (Yellow & White Label)	None (Black & White Label)	Other (Specify): _____	Groundwater	Wastewater	Drinking Water	Sludge				Soil	Other (Specify): _____
MW-2	10/15	3:40	4	G		X				X	2	-					X	X	X				
MW-3		2:30	4	↑		X				X	2	1	X				X	X	X				
MW-4		3:00	4			X				X	2	1	X				X	X					
MW-9		4:55	4			X				1	2	1	X				X	X					
MW-10		4:05	4			Y				1	2	1	X				X	X					
MW-11	↓	4:25	4	↓		Y				1	2	1	X				X	X					

# TestAmerica

INCORPORATED

## Sample Receipt and Temperature Log Form

Client: Bartek Lumar

Project: ACW, CEDAR FALLS

City: CEDAR FALLS, IA

Date: 10/17/03

Receiver's Initials HZ

Time (Delivered) 19:30

### Temperature Record

Cooler ID# (If Applicable)

4

C/On Ice

### Thermometer

- IR-905085 "A"
- IR-809065 "B"
- 22126775
- CF07-03-T2

Temp Blank

Custody Seals Present?

Yes

### Courier:

- Airborne  Speedy
- UPS  TA Courier
- Velocity  TA Field Svcs
- Fed Ex  Client
- DHL  Other: \_\_\_\_\_
- US Postal \_\_\_\_\_

Custody Seals Intact?

Yes  No

### Exceptions Noted

- Temperature Out of Conformance
- Non-conformance Report Started

- Sample(s) Not Received in Cooler
- Temperature Not Taken
- Sample(s) Received Within 6 hrs of sampling

Log-In By:

JP MF EM

Other: \_\_\_\_\_

\*Refer to SOP CF01-01 for Temperature Criteria

# TestAmerica<sup>®</sup>

INCORPORATED

## Sample Receipt and Temperature Log Form

Client: Bullock to make

Project:

Anderson Excav. + Wrecking

City: Council Bluffs

Council Bluffs C + D LF

Date: 10/17/03

Receiver's Initials HZ

Time (Delivered) 19:30

### Temperature Record

Cooler ID# (If Applicable)

EM22

2

°C/On Ice

### Thermometer

- IR-905085 "A"
- IR-809065 "B"
- 22126775
- CF07-03-T2

### Courier:

- |                                    |                                                |
|------------------------------------|------------------------------------------------|
| <input type="checkbox"/> Airborne  | <input type="checkbox"/> Speedy                |
| <input type="checkbox"/> UPS       | <input checked="" type="checkbox"/> TA Courier |
| <input type="checkbox"/> Velocity  | <input type="checkbox"/> TA Field SvS          |
| <input type="checkbox"/> Fed Ex    | <input type="checkbox"/> Client                |
| <input type="checkbox"/> DHL       | <input type="checkbox"/> Other: _____          |
| <input type="checkbox"/> US Postal | _____                                          |

Temp Blank X

Custody Seals Present?

Yes

Custody Seals Intact?

Yes       No

### Exceptions Noted

- Sample(s) Not Received in Cooler
- Temperature Not Taken
- Sample(s) Received Within 6 hrs of sampling

Temperature Out of Conformance

Non-conformance Report Started

Log-In By:

JP MF EM

Other: \_\_\_\_\_

\*Refer to SOP CF01-01 for Temperature Criteria

**APPENDIX D**  
**EXCEEDANCE TABLES**

**Summary of Statistical Exceedances  
Groundwater Monitoring Wells  
by Well Cluster**

Page 1 of 1

**Council Bluffs Construction and Demolition Landfill - 78-SDP-01-89**

**MW-10 - Cluster DN2**

**Chloride**

Mean:	8.88	STD:	4.47	Exceedances Level:	17.816
-------	------	------	------	--------------------	--------

Current Action Levels	None Established
-----------------------	------------------

4/17/2003	34.7 mg/L
-----------	-----------

10/15/2003	35.2 mg/L
------------	-----------

**MW-2 - Cluster DN1**

**Arsenic, Dissolved**

Mean:	0.0012	STD:	0.0004	Exceedances Level:	0.001886
-------	--------	------	--------	--------------------	----------

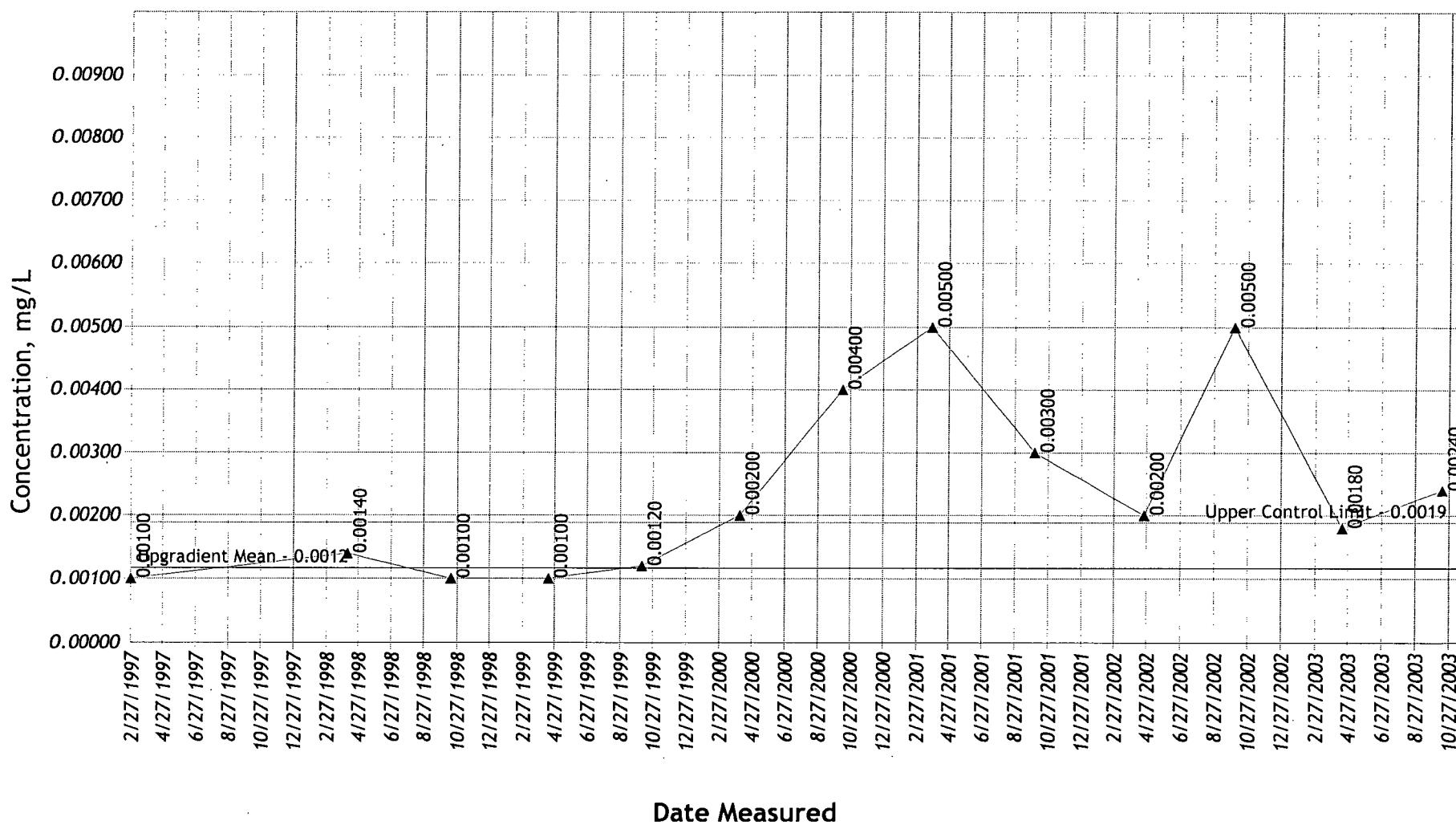
Current Action Levels	MCL - 0.010 mg/L	NRL - 0.00002 mg/L
-----------------------	------------------	--------------------

10/15/2003	0.0024 mg/L
------------	-------------

**APPENDIX E**

**GRAPHS OF ANALYTICAL  
PARAMETERS / MONITORING POINTS**

## Arsenic, Dissolved Trends - (MW-2)

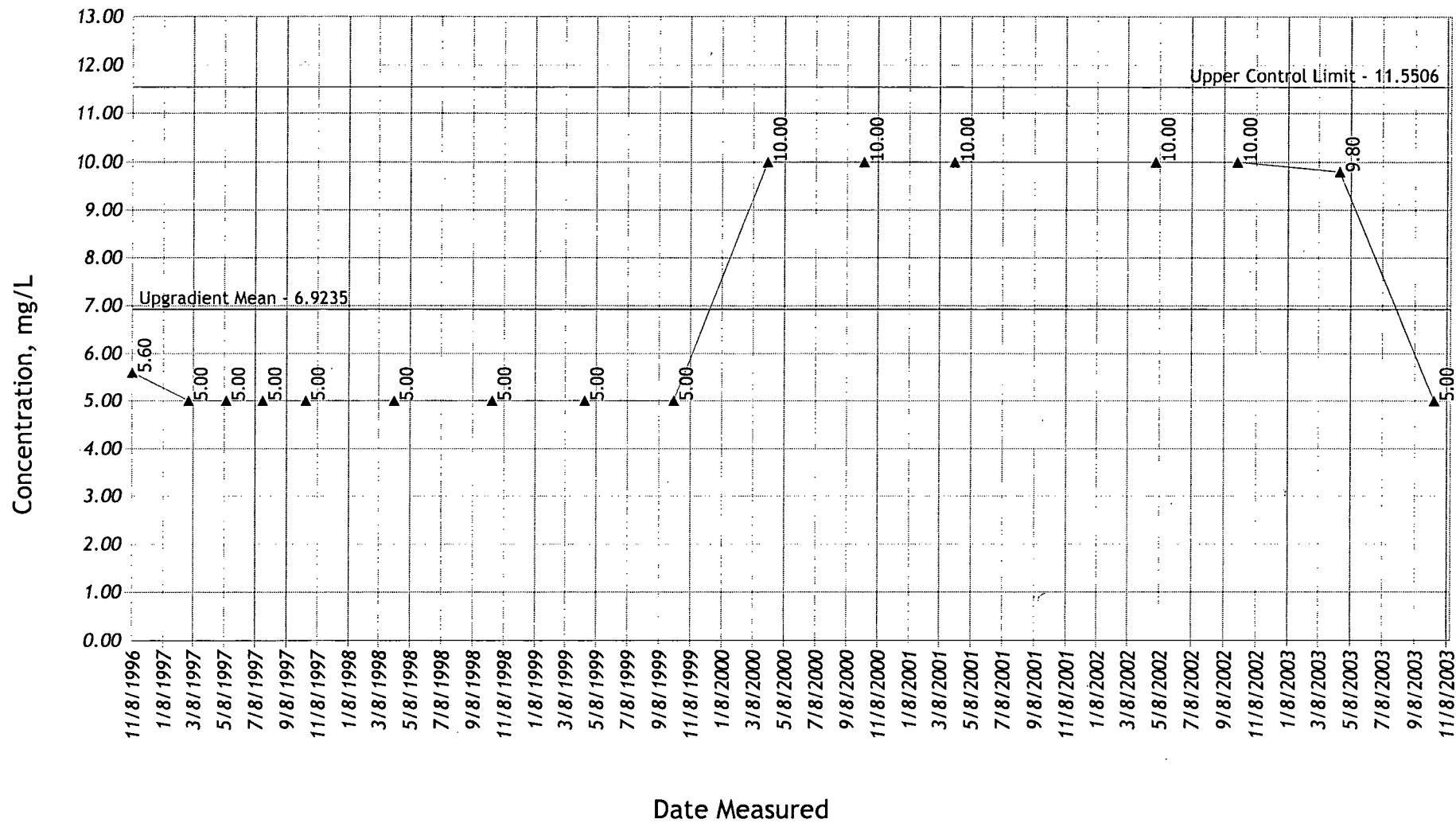


1

**Arsenic, Dissolved**  
**Council Bluffs Construction and Demolition Landfill**  
78-SDP-01-89

03001  
11/14/2003 12:26:25 PM

## Chemical Oxygen Demand Trends - (MW-11)

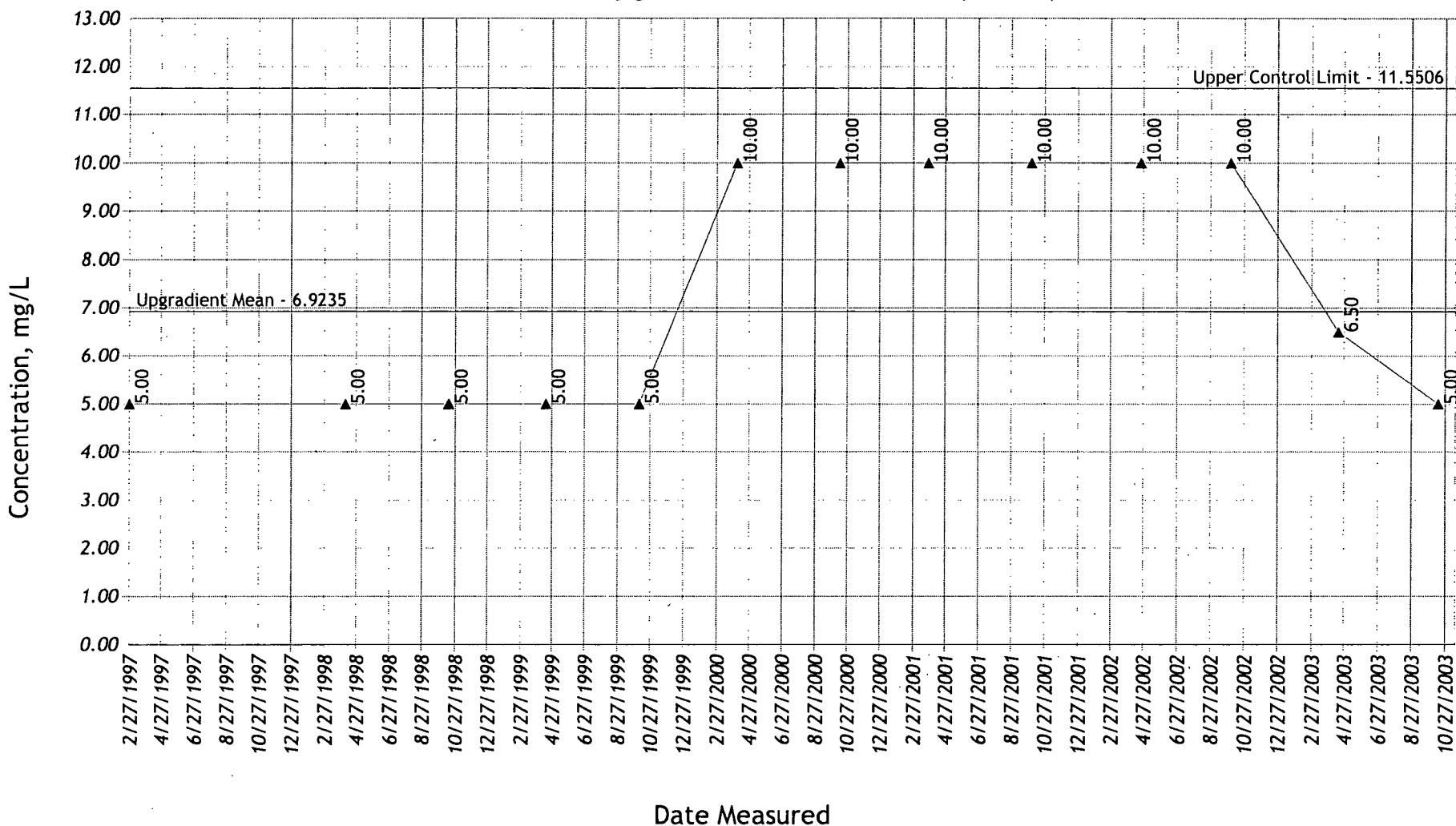


2

**Chemical Oxygen Demand**  
**Council Bluffs Construction and Demolition Landfill**  
78-SDP-01-89

03001  
11/14/2003 12:26:34 PM

## Chemical Oxygen Demand Trends - (MW-2)

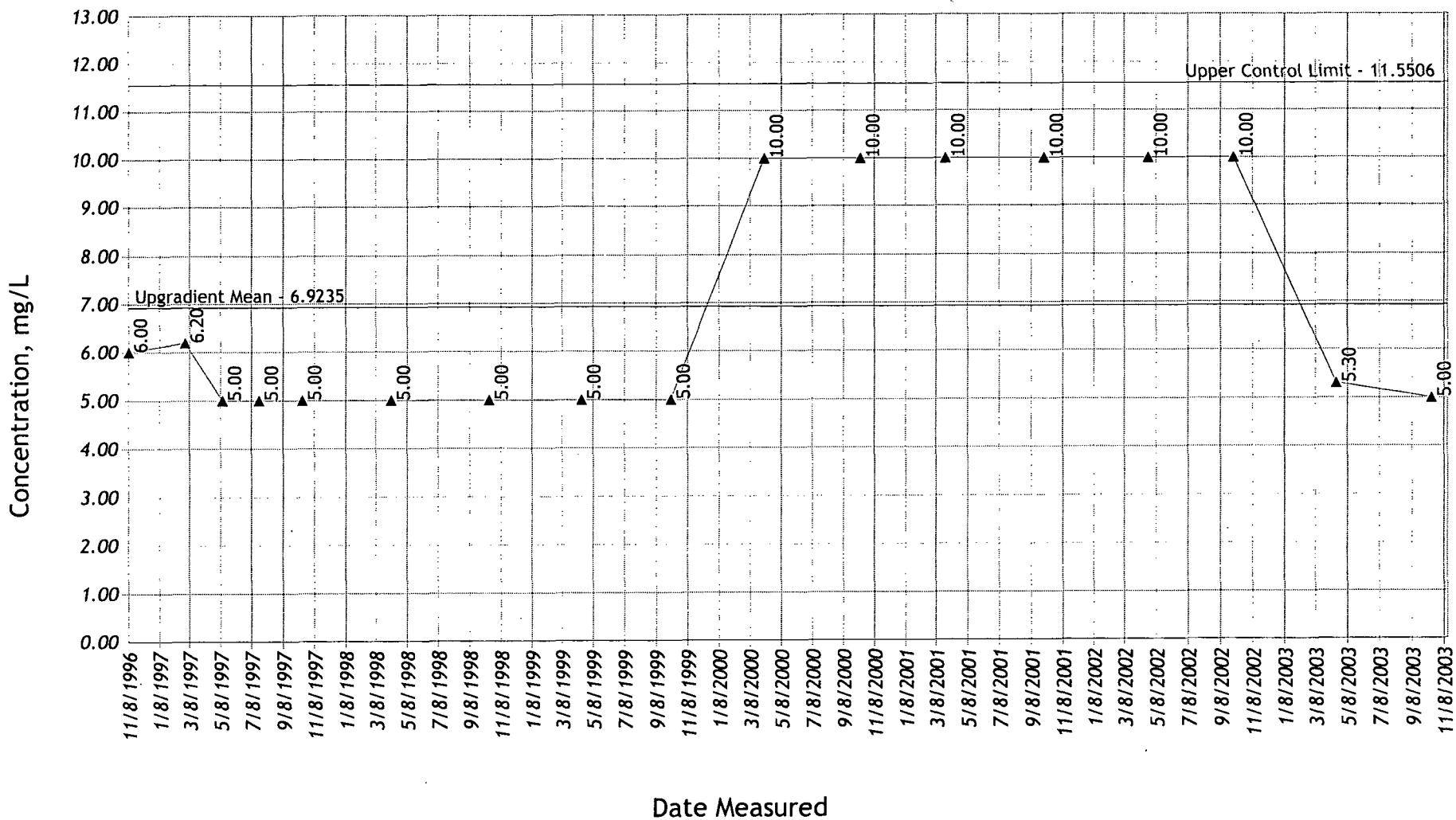


3

**Chemical Oxygen Demand**  
**Council Bluffs Construction and Demolition Landfill**  
78-SDP-01-89

03001  
11/14/2003 12:26:40 PM

## Chemical Oxygen Demand Trends - (MW-9)

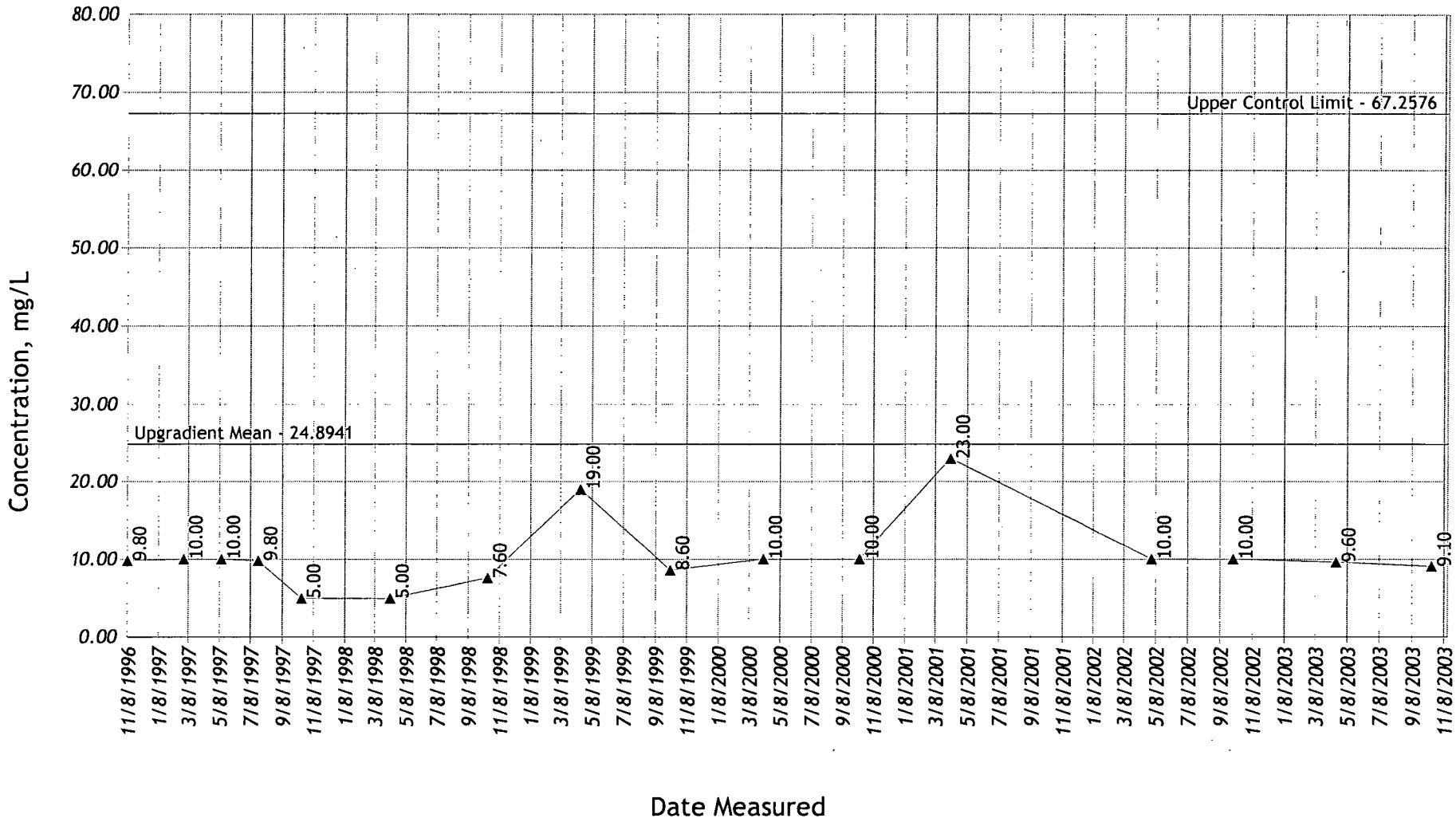


4

**Chemical Oxygen Demand  
Council Bluffs Construction and Demolition Landfill  
78-SDP-01-89**

03001  
11/14/2003 12:26:46 PM

## **Chloride Trends - (MW-11)**

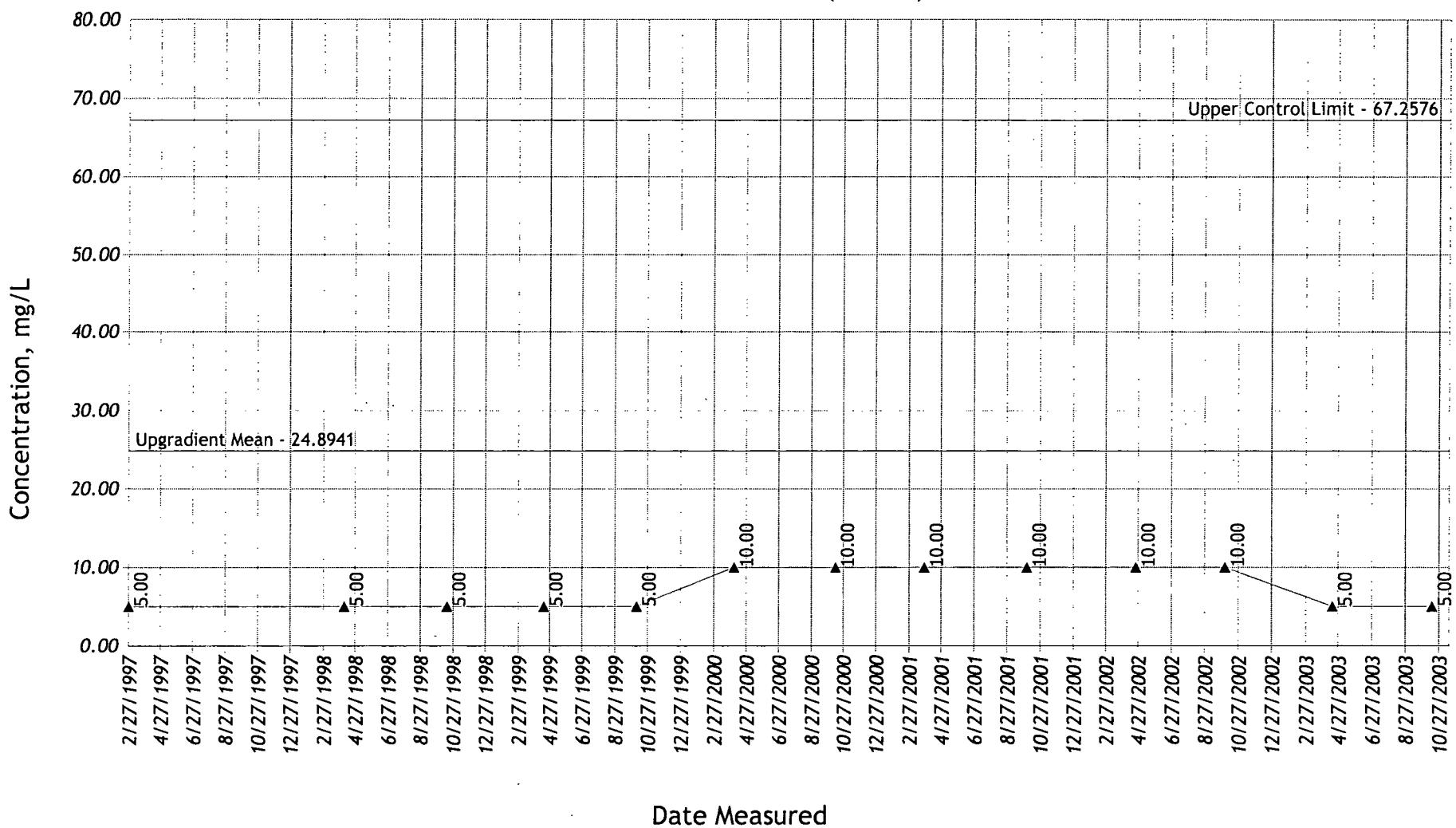


5

**Chloride**  
**Council Bluffs Construction and Demolition Landfill**  
78-SDP-01-89

03001  
11/14/2003 12:26:52 PM

## **Chloride Trends - (MW-2)**

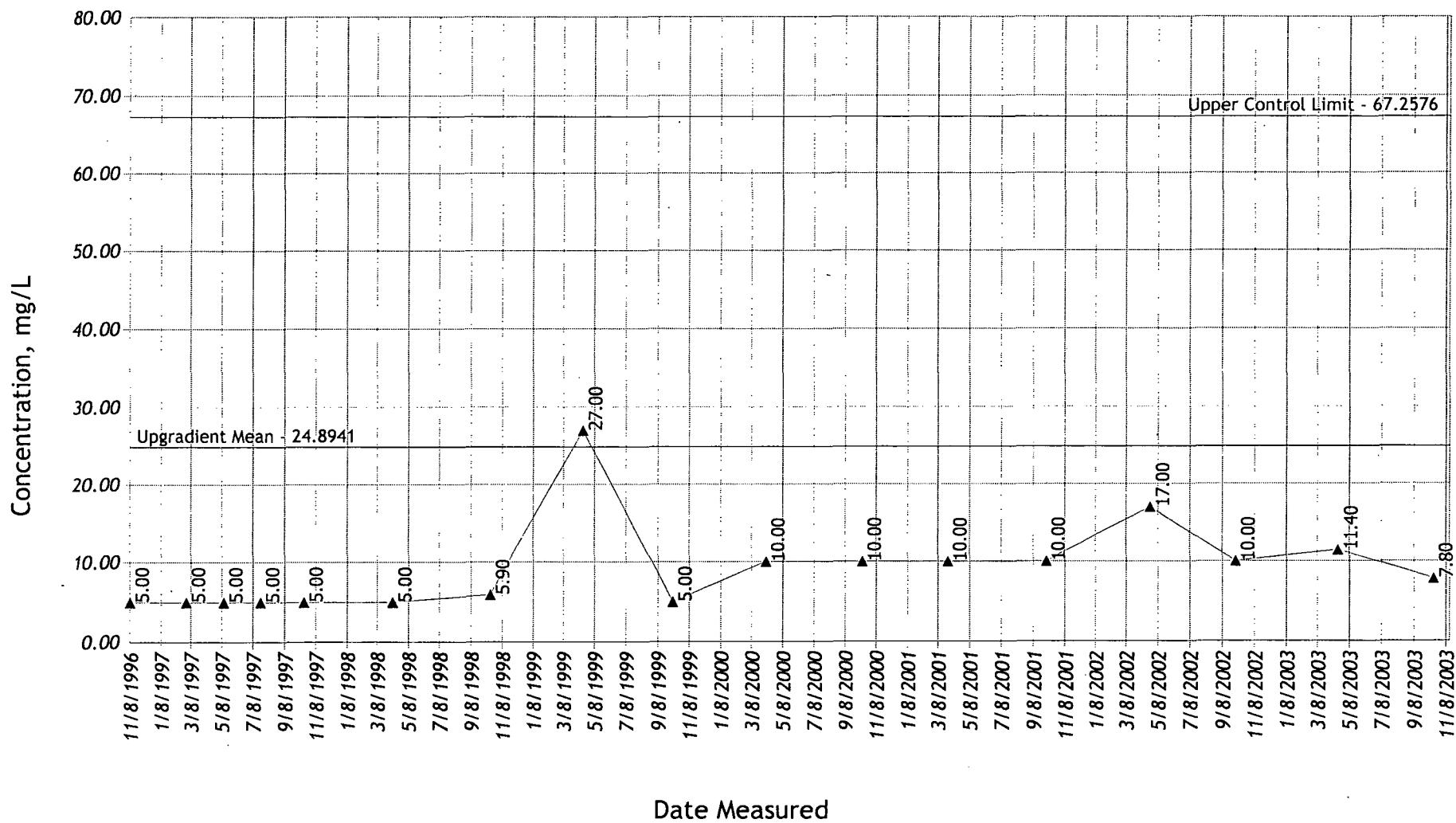


**6**

**Chloride**  
**Council Bluffs Construction and Demolition Landfill**  
78-SDP-01-89

03001  
11/14/2003 12:26:58 PM

## **Chloride Trends - (MW-9)**

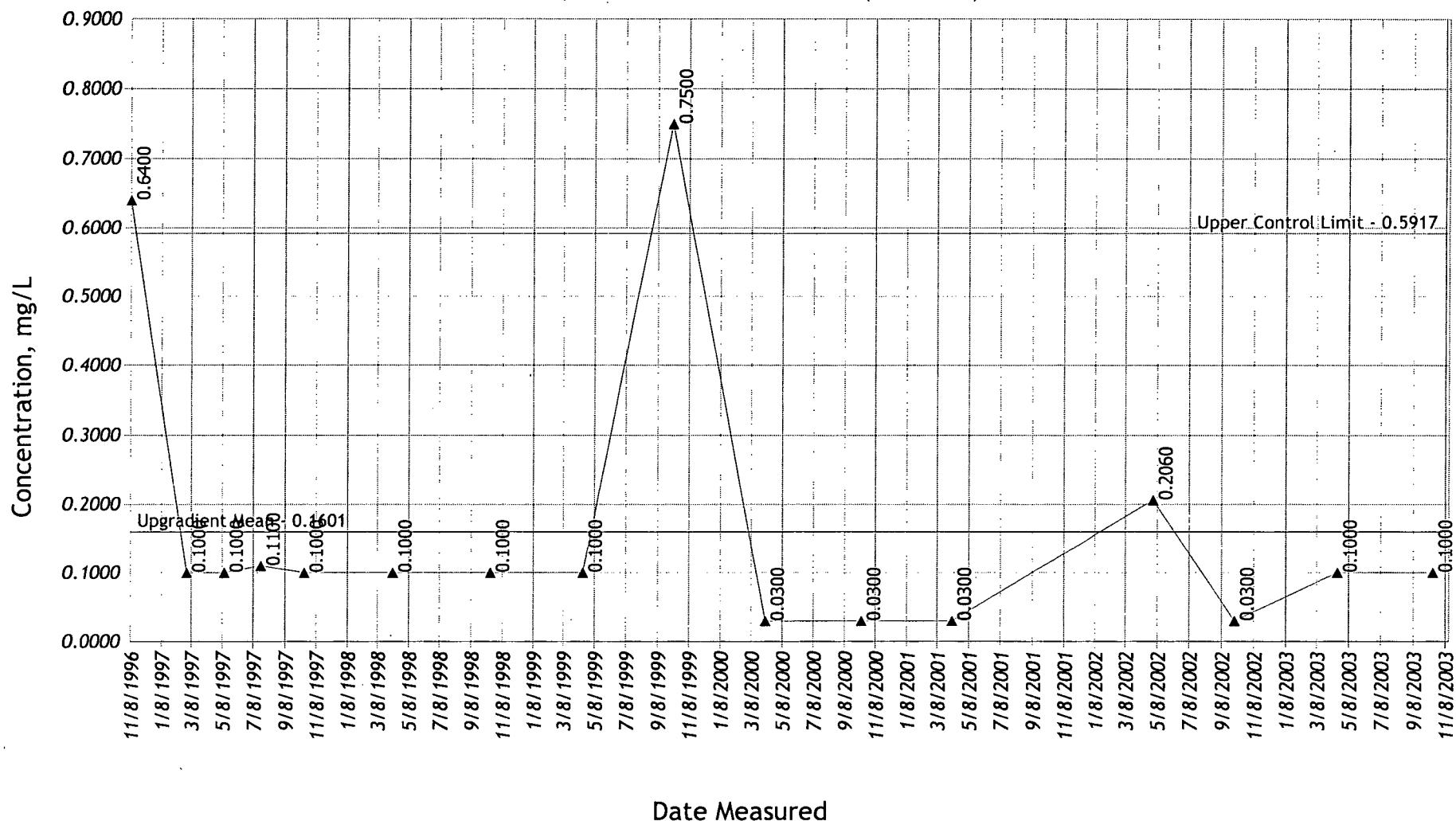


7

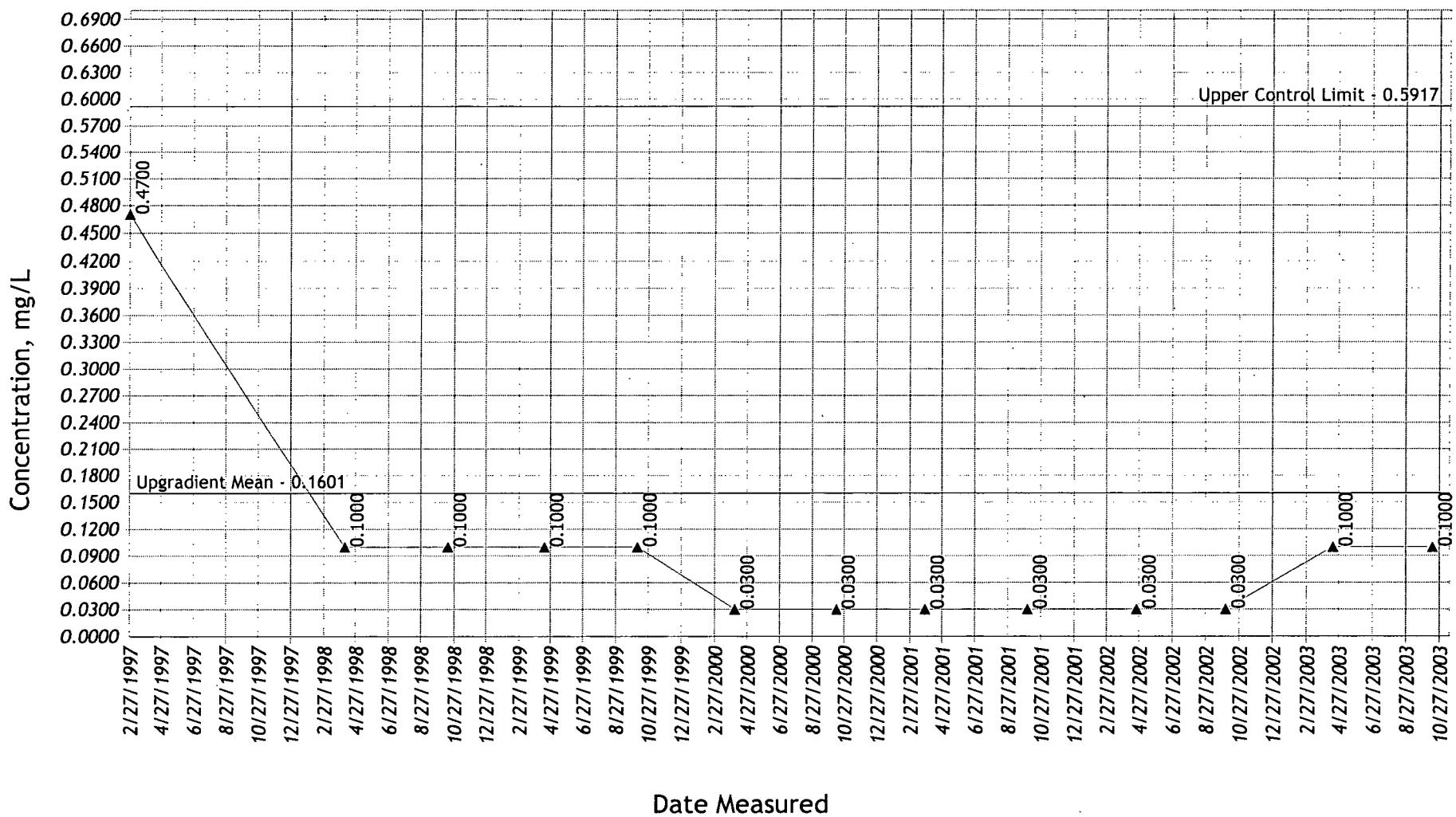
**Chloride**  
**Council Bluffs Construction and Demolition Landfill**  
78-SDP-01-89

03001  
11/14/2003 12:27:04 PM

## Iron, Dissolved Trends - (MW-11)



## Iron, Dissolved Trends - (MW-2)

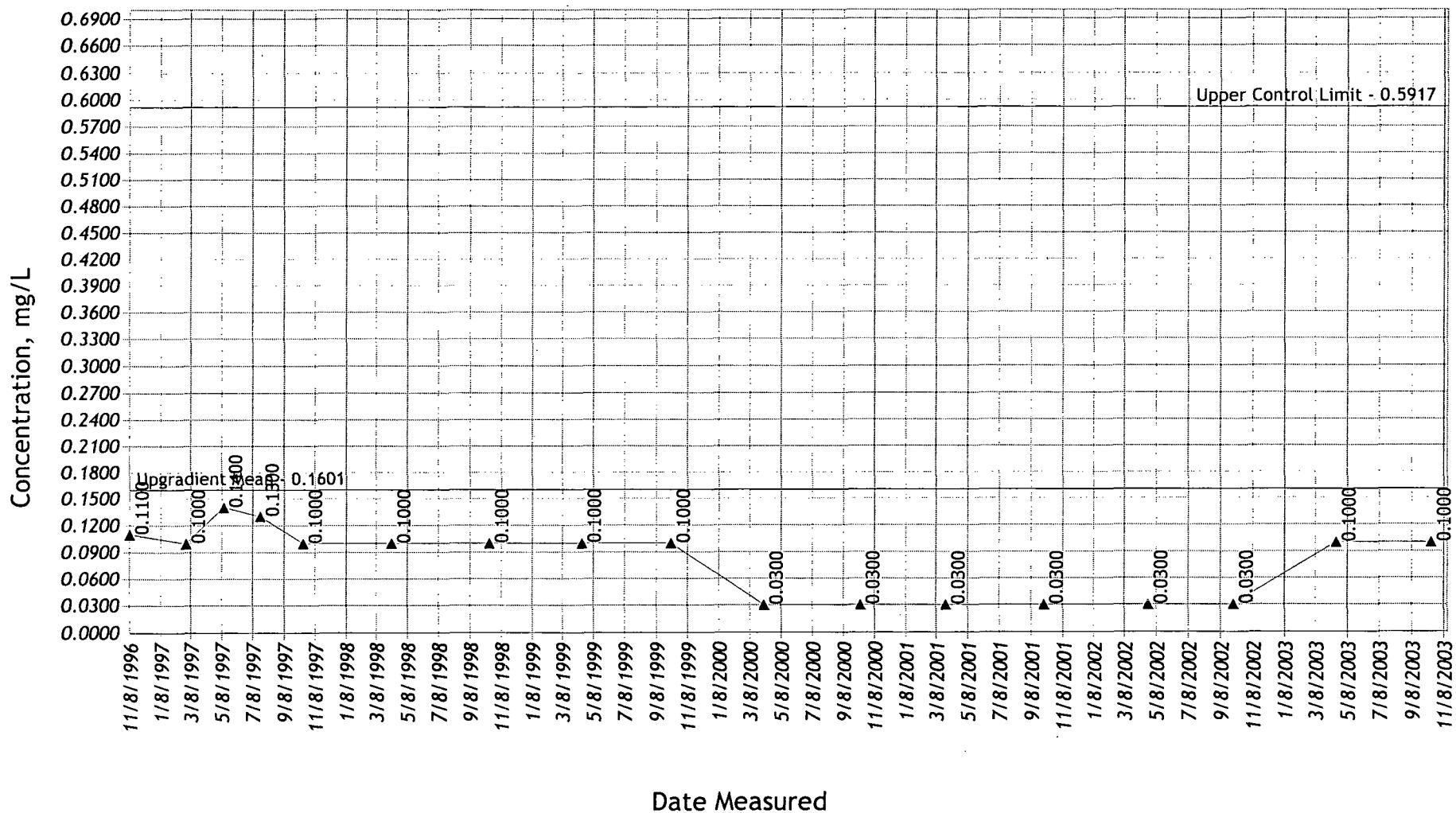


9

**Iron, Dissolved**  
**Council Bluffs Construction and Demolition Landfill**  
78-SDP-01-89

03001  
11/14/2003 12:27:24 PM

## Iron, Dissolved Trends - (MW-9)



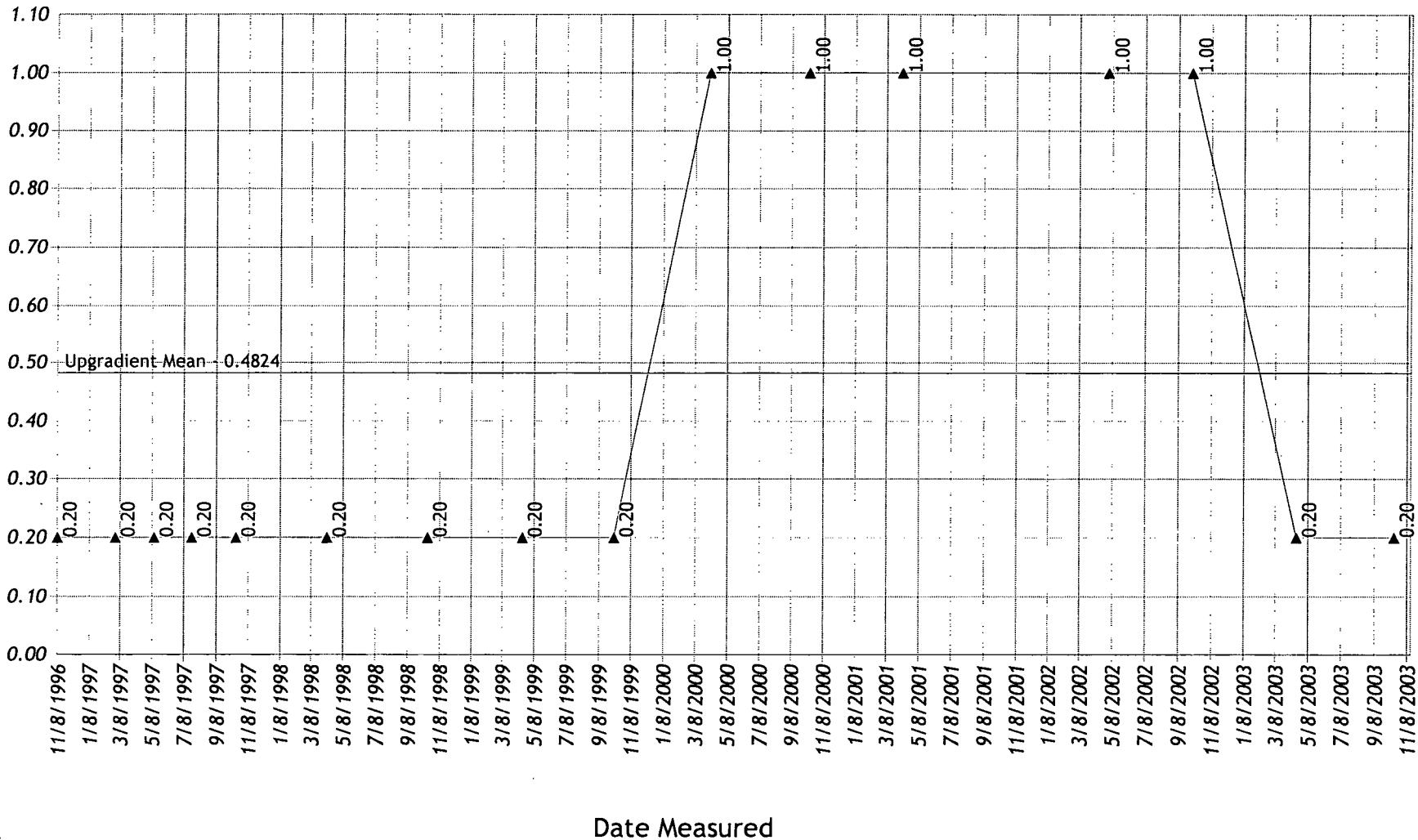
10

**Iron, Dissolved**  
**Council Bluffs Construction and Demolition Landfill**  
78-SDP-01-89

03001  
11/14/2003 12:27:30 PM

## Nitrogen, Ammonia Trends - (MW-11)

Concentration, mg/L



Note: The upper control limit is not shown as the standard deviation was not calculated due to consistent parameter non-detect in the up-gradient monitoring point.

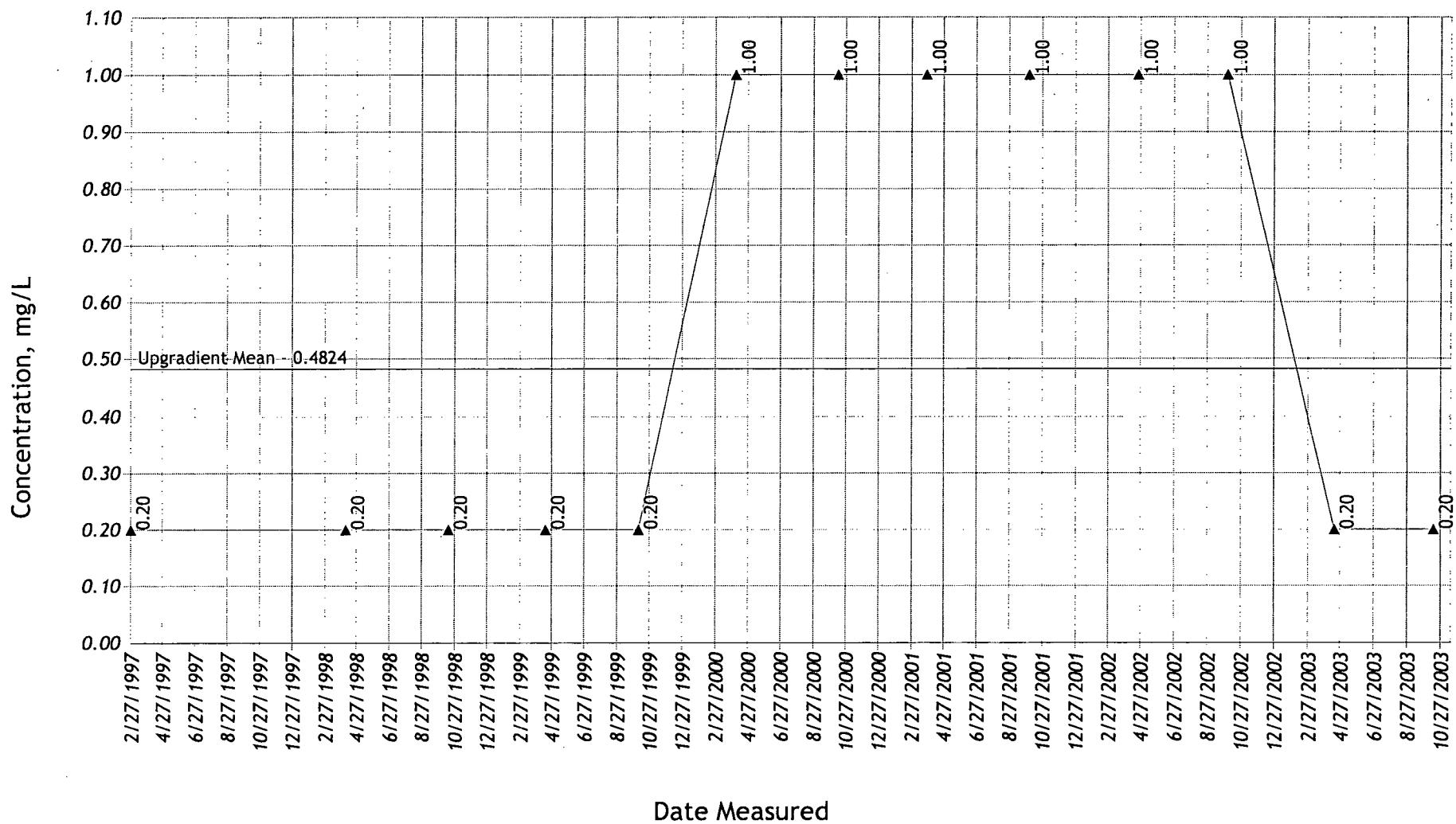
11

**Nitrogen, Ammonia**  
**Council Bluffs Construction and Demolition Landfill**  
 78-SDP-01-89

03001

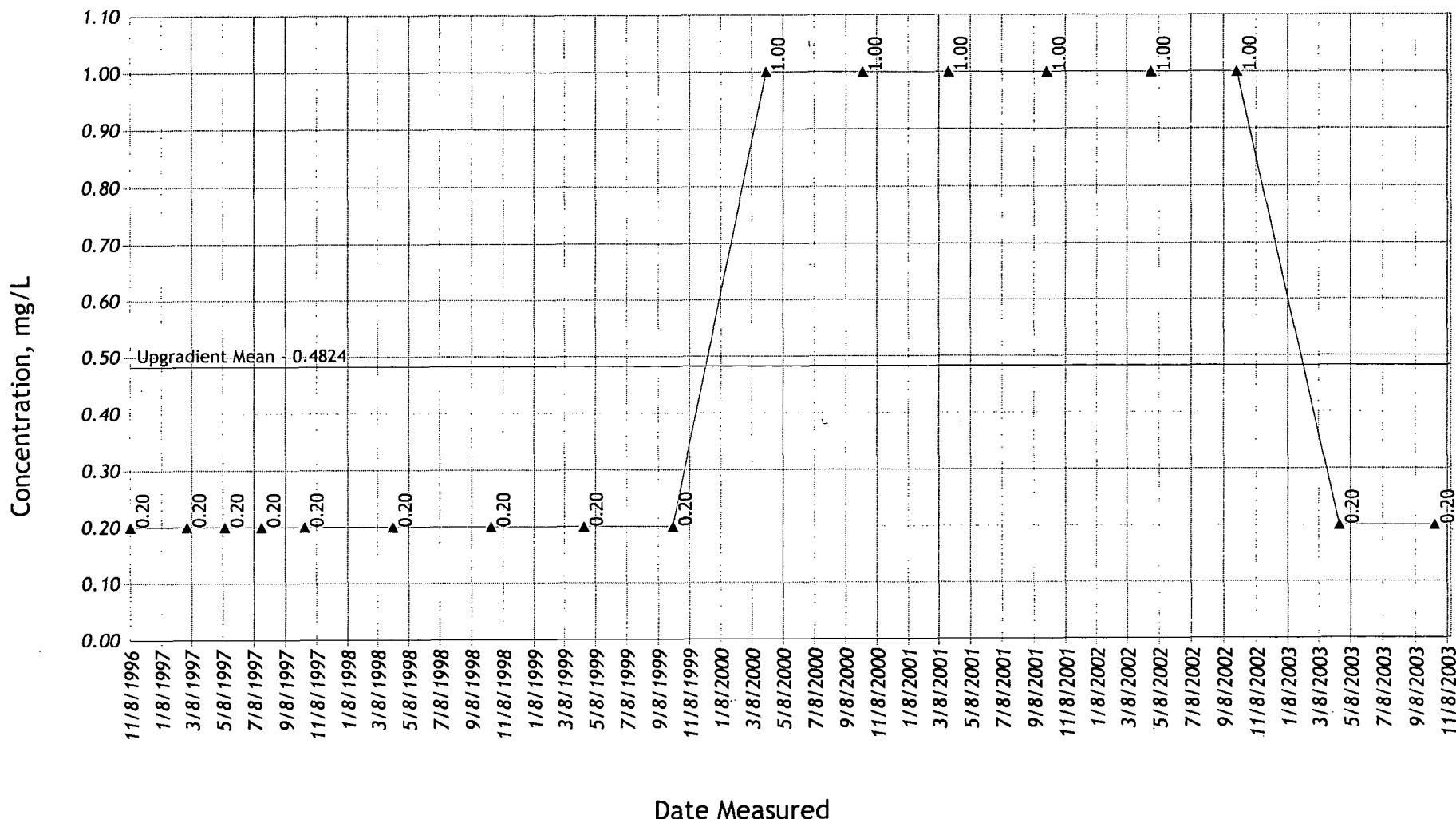
11/14/2003 12:27:43 PM

## Nitrogen, Ammonia Trends - (MW-2)



**Note:** The upper control limit is not shown as the standard deviation was not calculated due to consistent parameter non-detect in the up-gradient monitoring point.

## Nitrogen, Ammonia Trends - (MW-9)



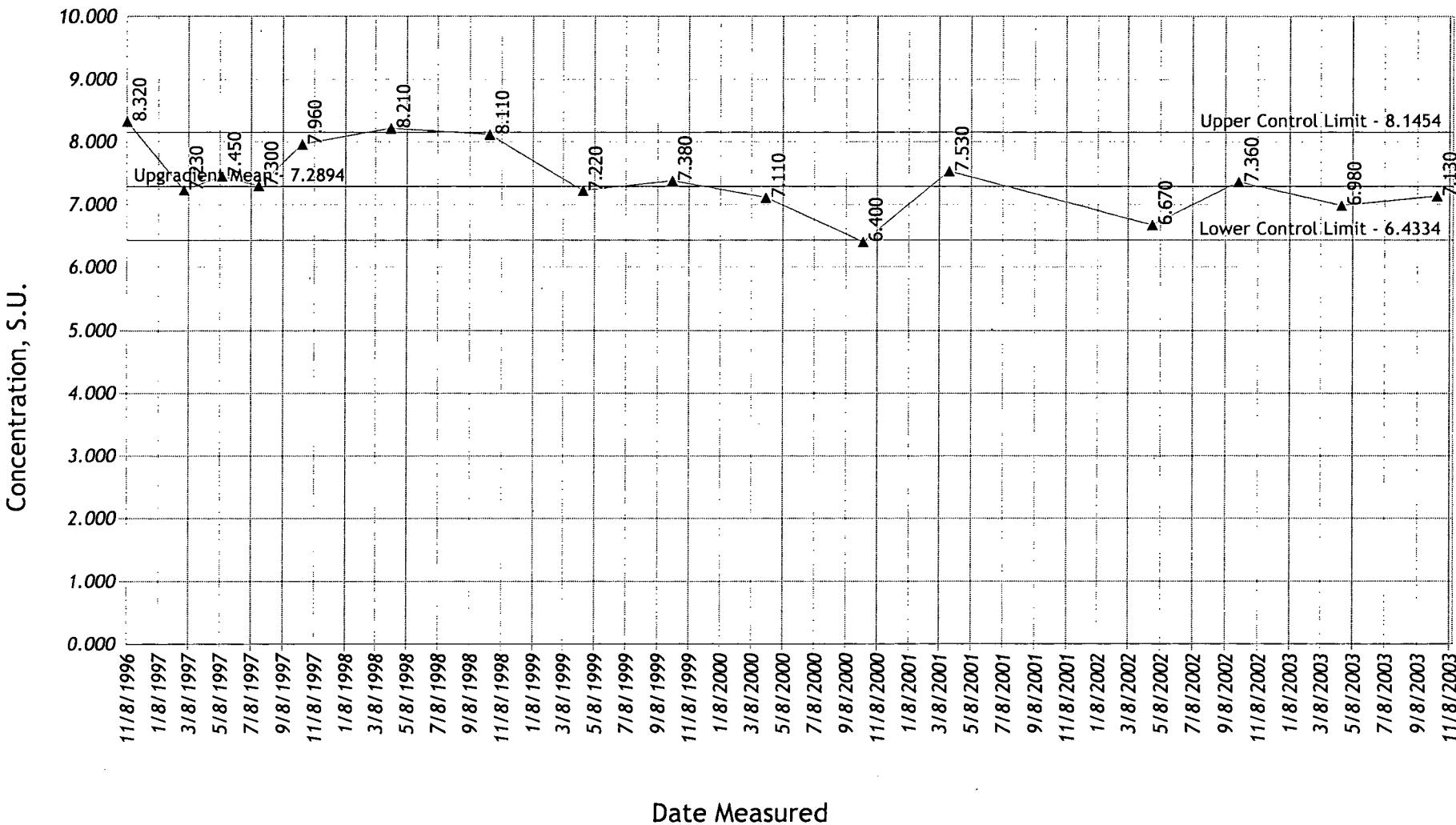
Note: The upper control limit is not shown as the standard deviation was not calculated due to consistent parameter non-detect in the up-gradient monitoring point.

13

**Nitrogen, Ammonia**  
**Council Bluffs Construction and Demolition Landfill**  
 78-SDP-01-89

03001  
 11/14/2003 12:27:54 PM

## pH Trends - (MW-11)



14

pH

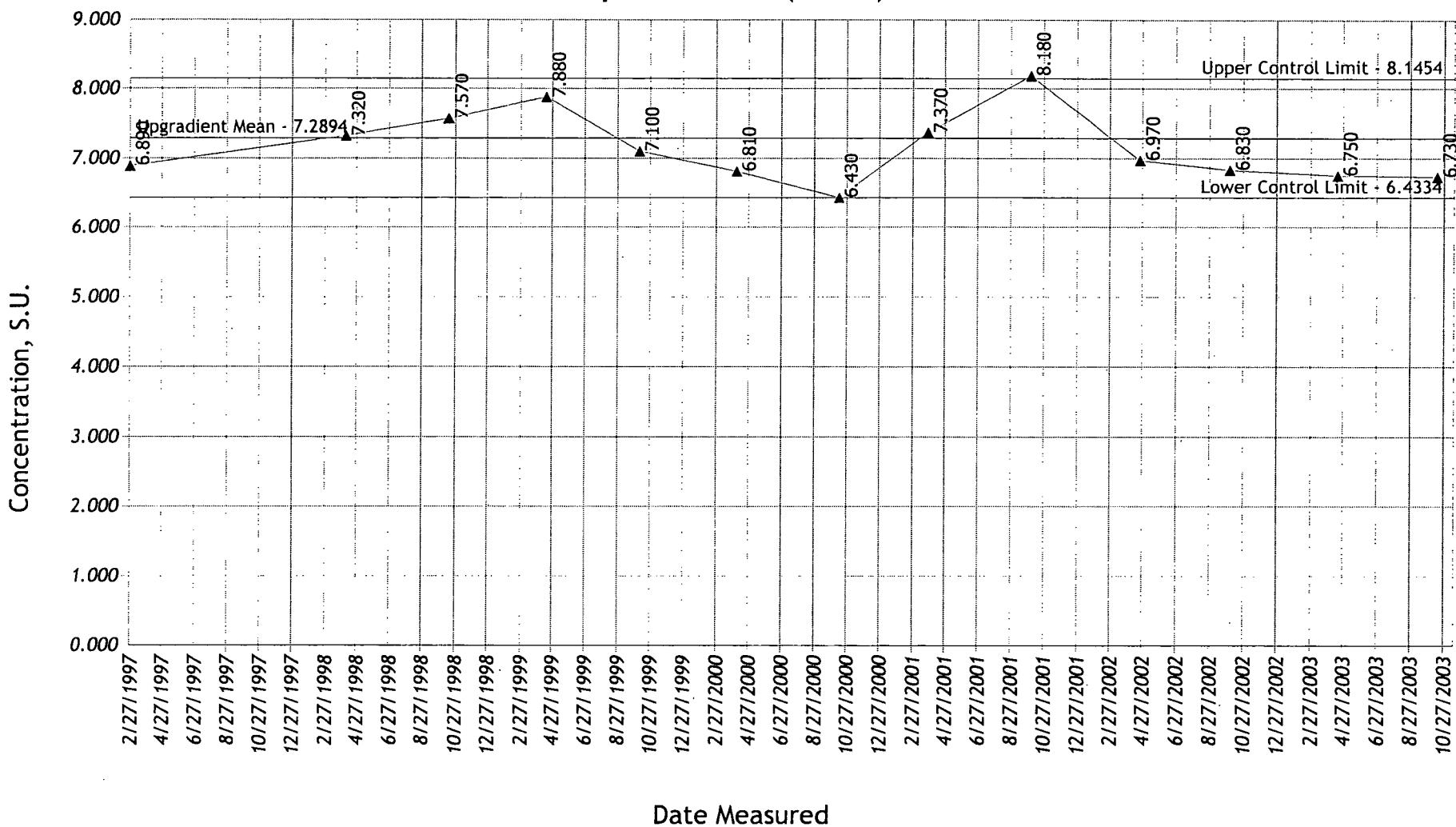
Council Bluffs Construction and Demolition Landfill

78-SDP-01-89

03001

11/14/2003 12:28:01 PM

## pH Trends - (MW-2)



15

pH

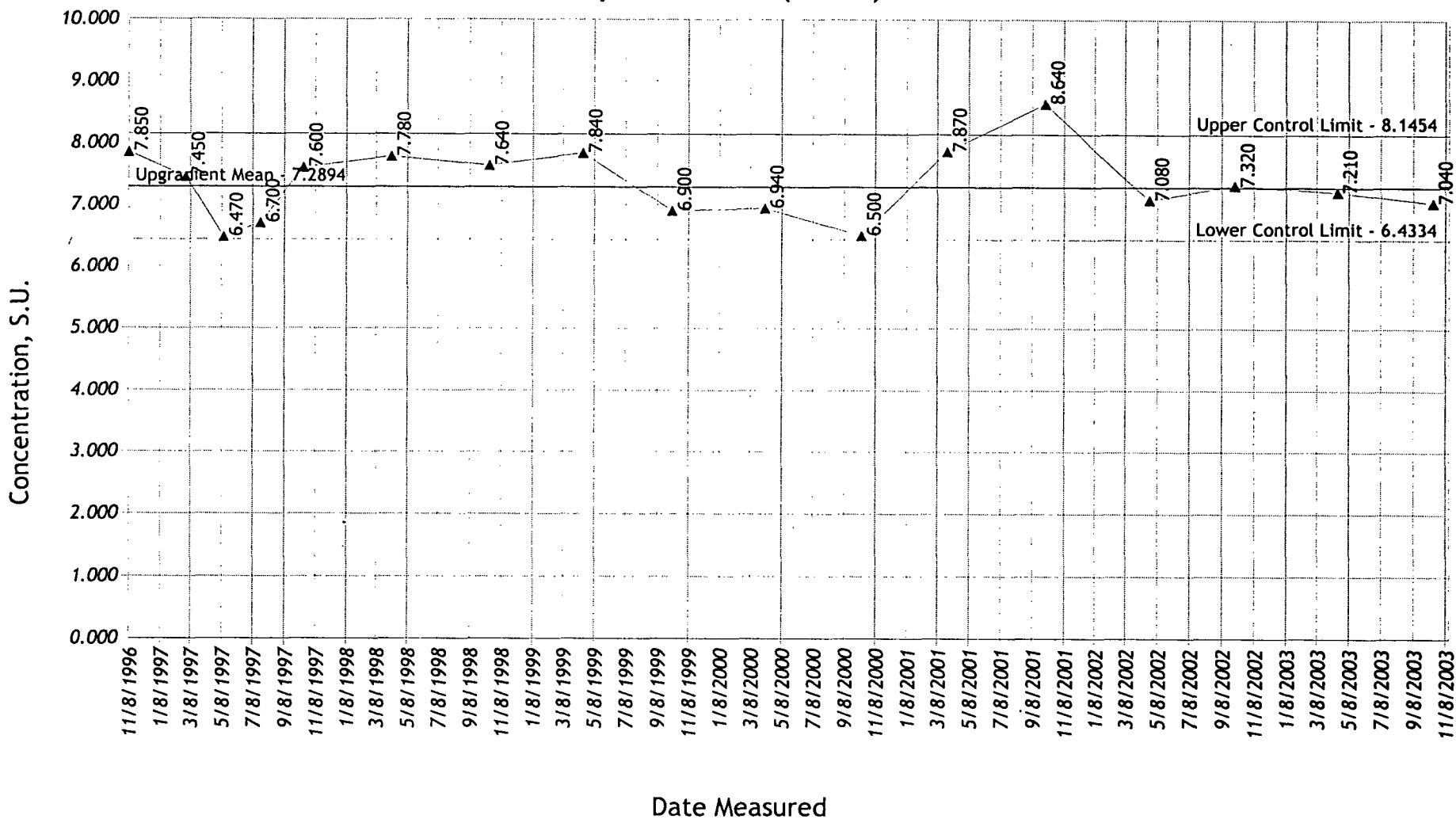
Council Bluffs Construction and Demolition Landfill

78-SDP-01-89

03001

11/14/2003 12:28:08 PM

## pH Trends - (MW-9)



16

pH

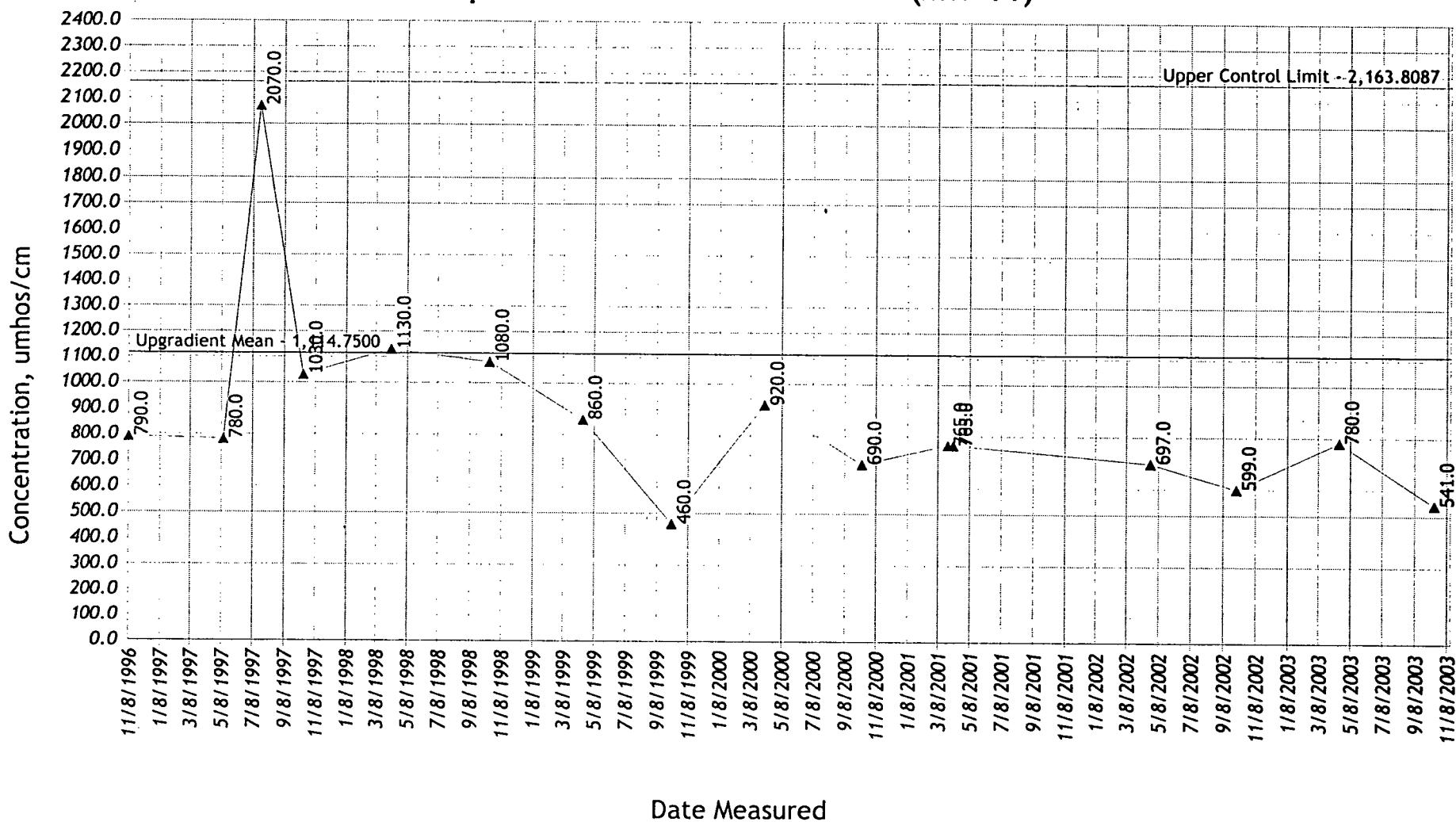
Council Bluffs Construction and Demolition Landfill

78-SDP-01-89

03001

11/14/2003 12:28:13 PM

## Specific Conductance Trends - (MW-11)

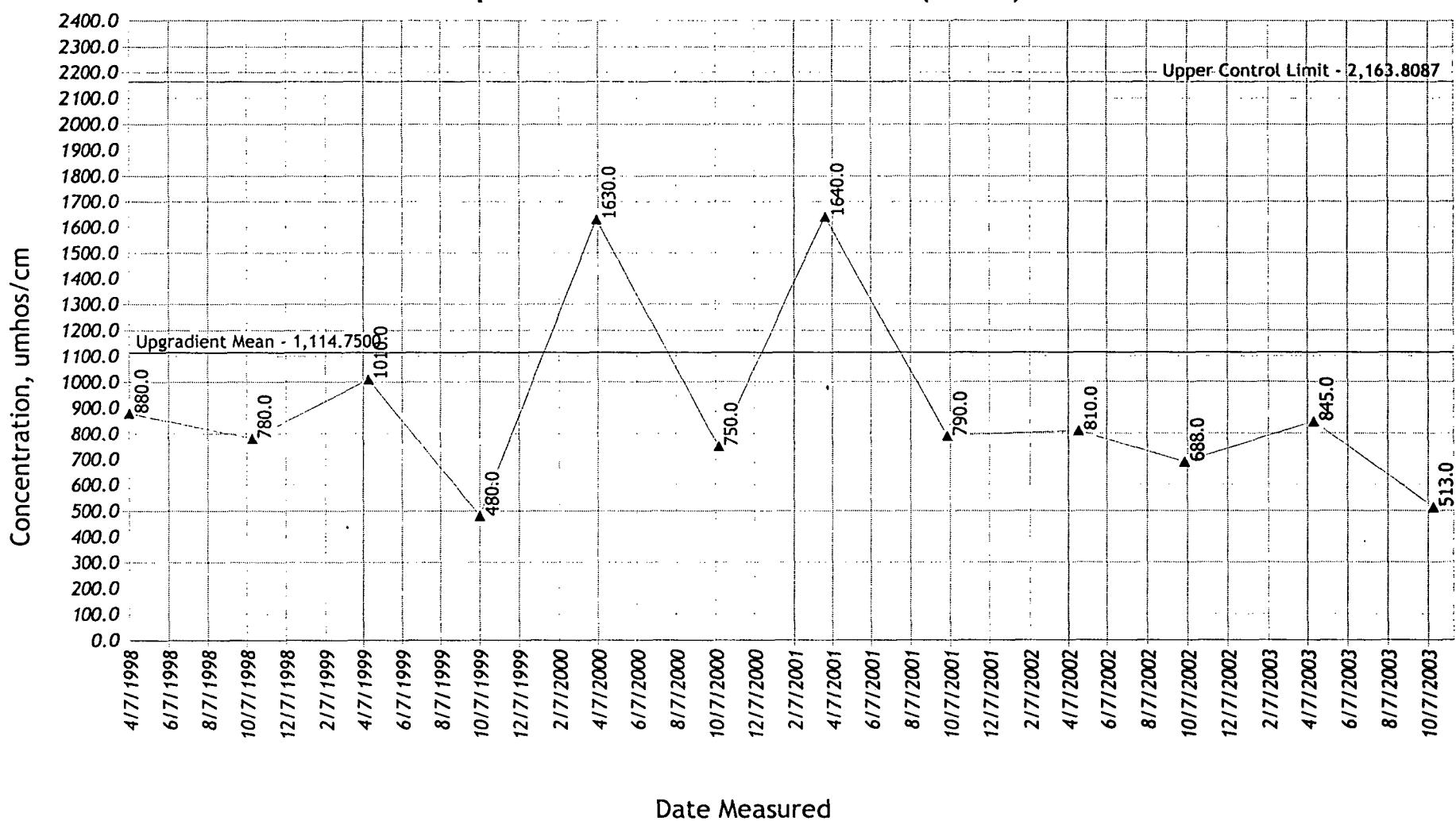


17

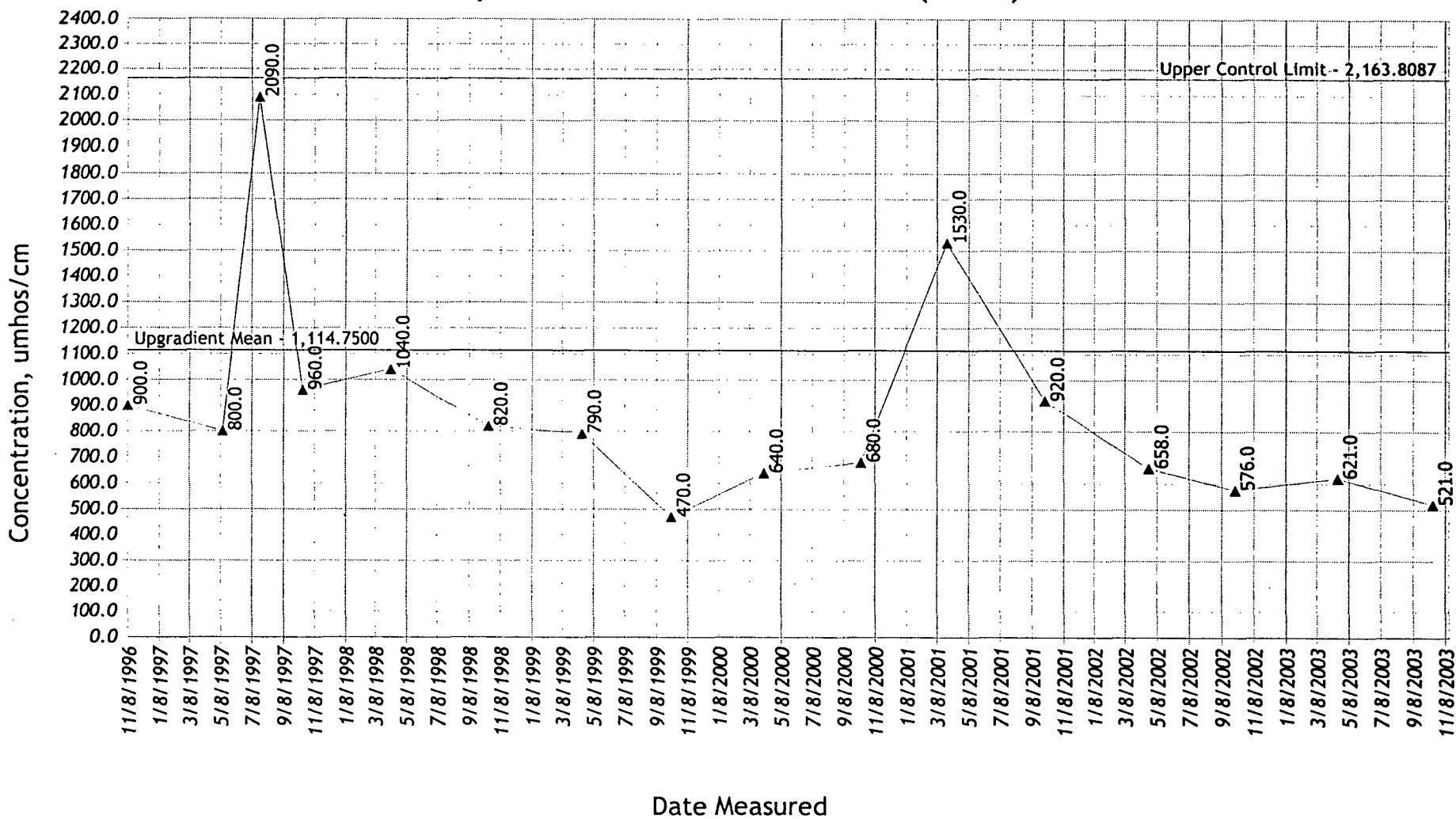
**Specific Conductance  
Council Bluffs Construction and Demolition Landfill  
78-SDP-01-89**

03001  
11/14/2003 12:28:19 PM

## Specific Conductance Trends - (MW-2)



## Specific Conductance Trends - (MW-9)

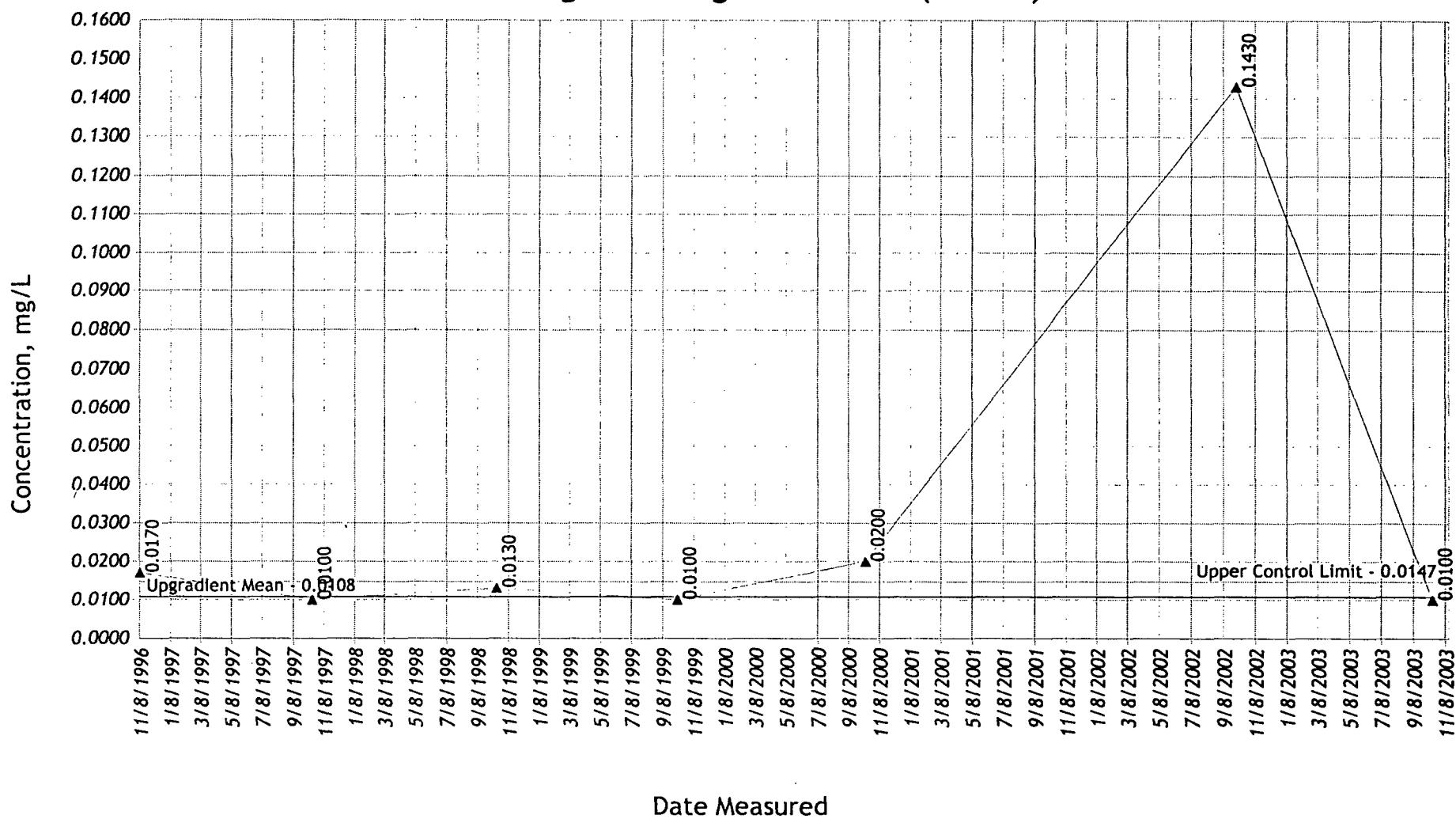


19

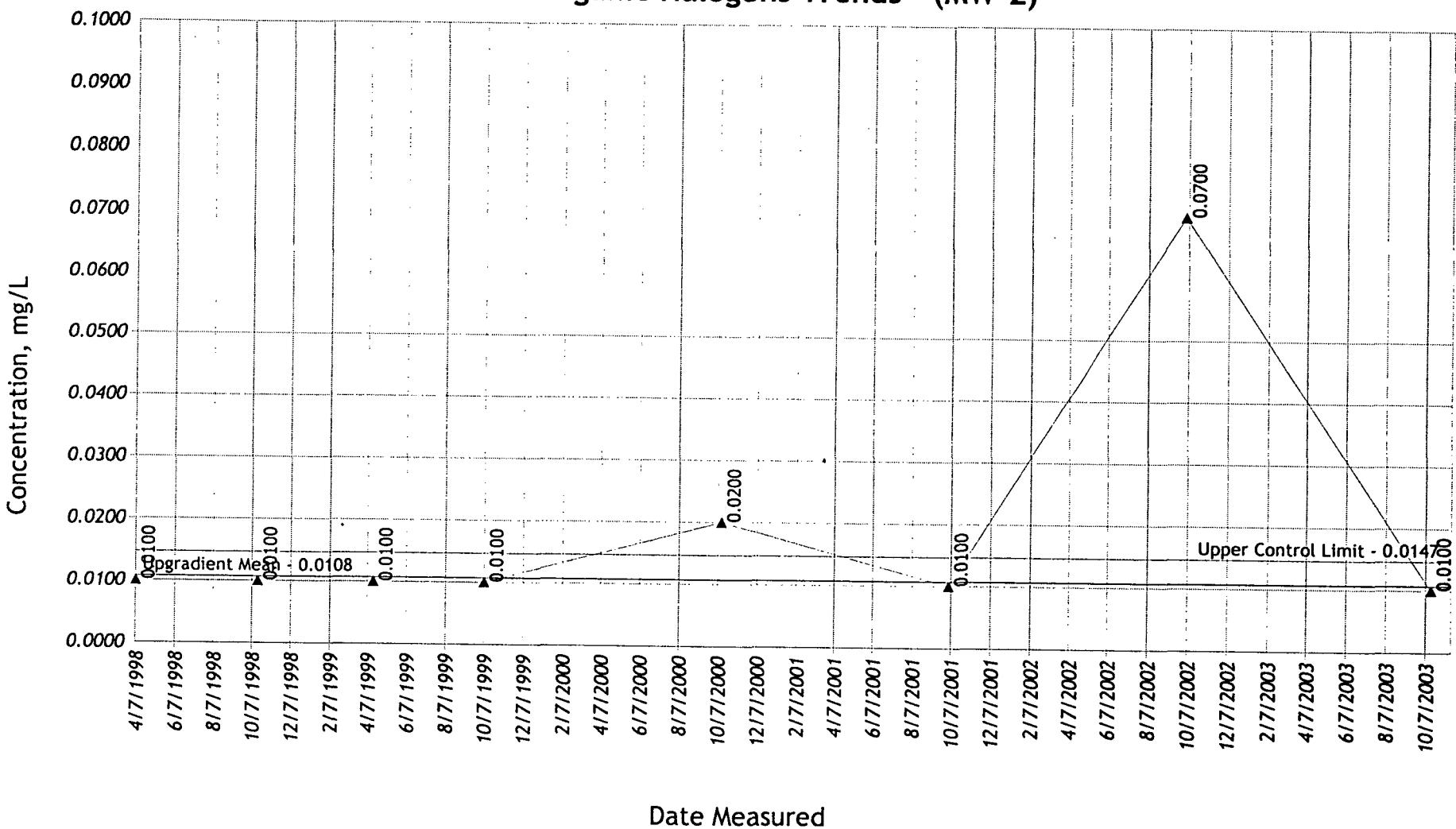
Specific Conductance  
Council Bluffs Construction and Demolition Landfill  
78-SDP-01-89

03001  
11/14/2003 12:28:36 PM

### Total Organic Halogens Trends - (MW-11)



### Total Organic Halogens Trends - (MW-2)

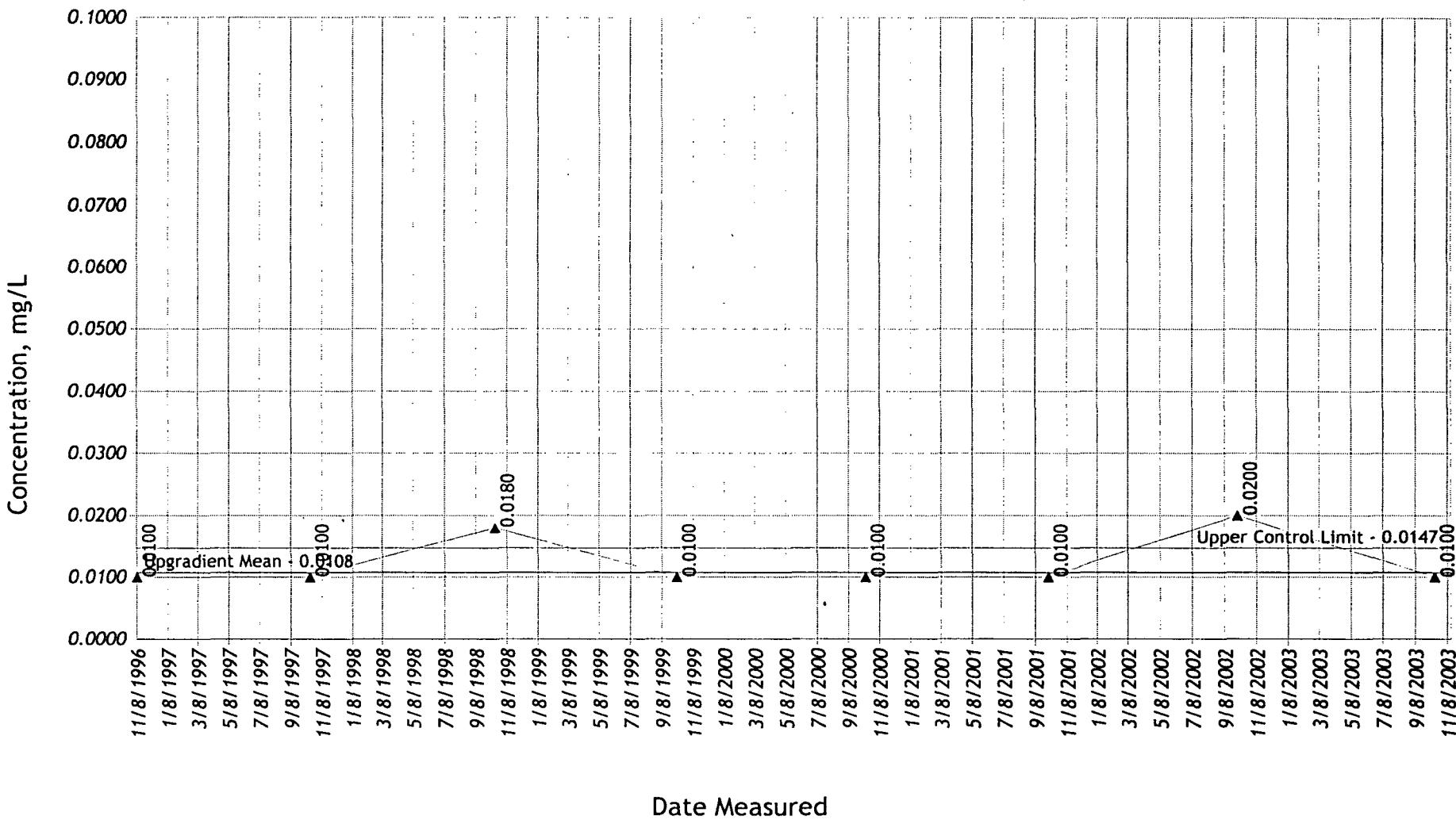


21

**Total Organic Halogens**  
**Council Bluffs Construction and Demolition Landfill**  
78-SDP-01-89

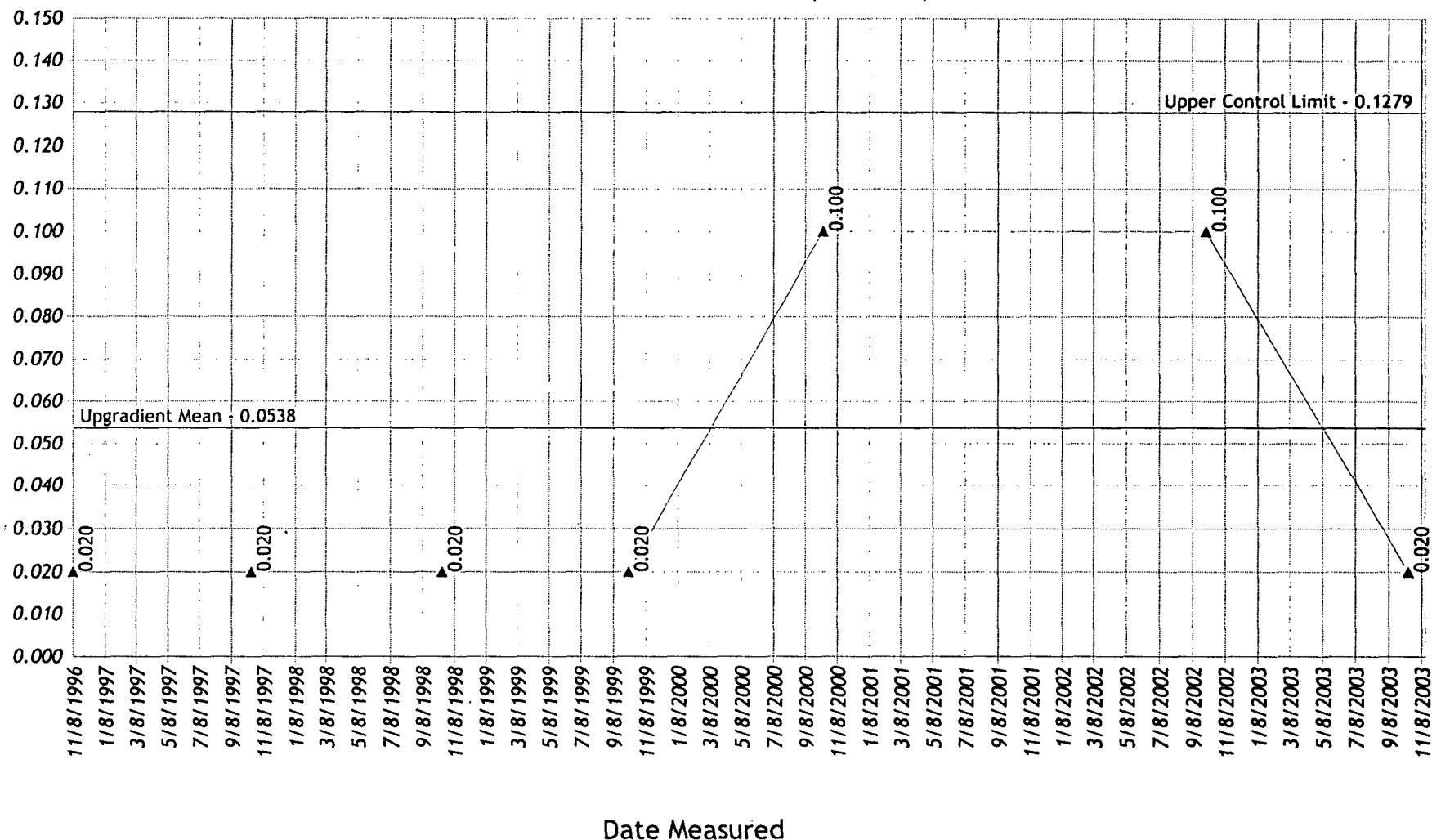
03001  
11/14/2003 12:28:47 PM

## Total Organic Halogens Trends - (MW-9)



## Total Phenols Trends - (MW-11)

Concentration, mg/L

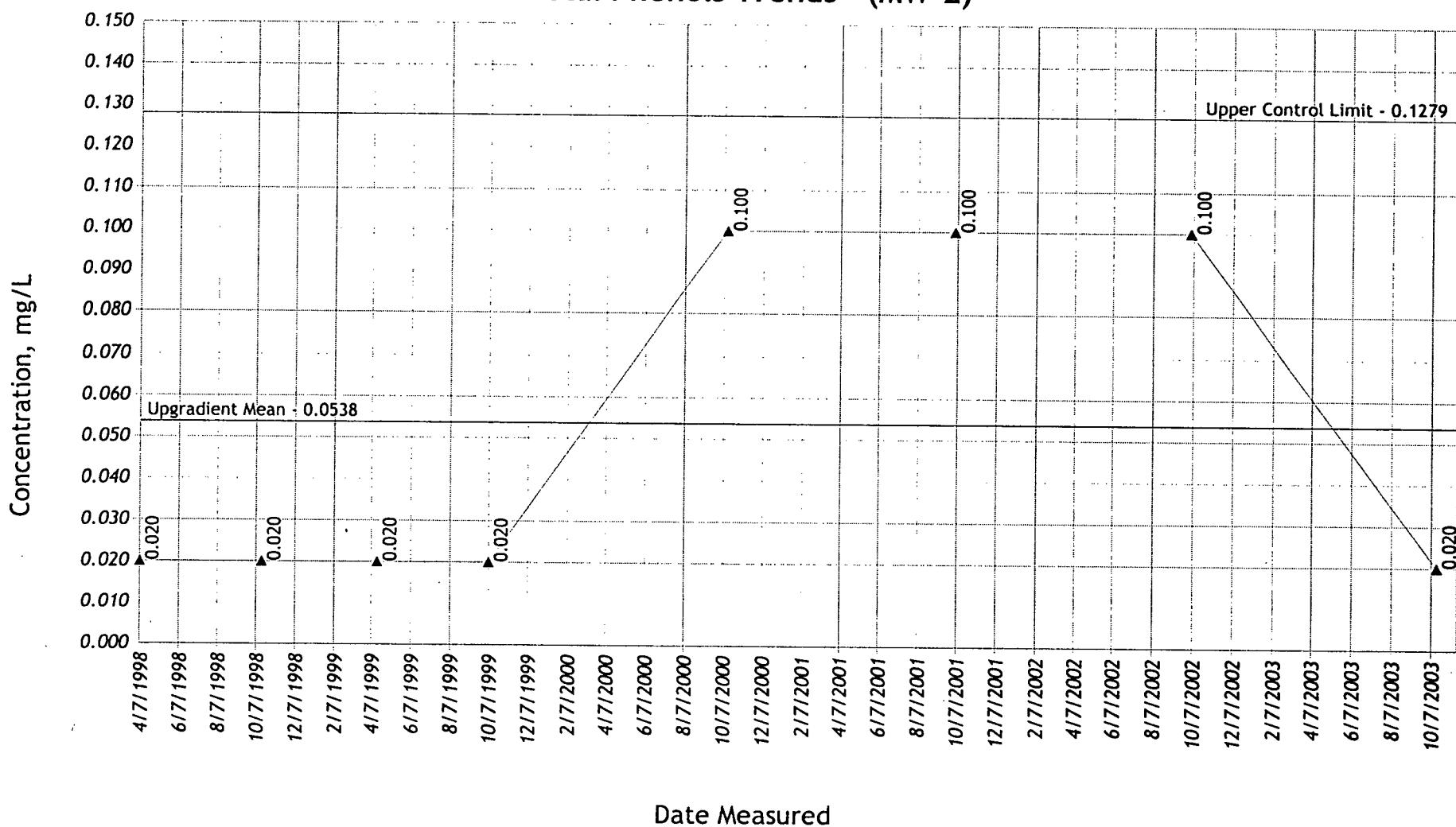


23

**Total Phenols**  
**Council Bluffs Construction and Demolition Landfill**  
78-SDP-01-89

03001  
11/14/2003 12:28:59 PM

### Total Phenols Trends - (MW-2)

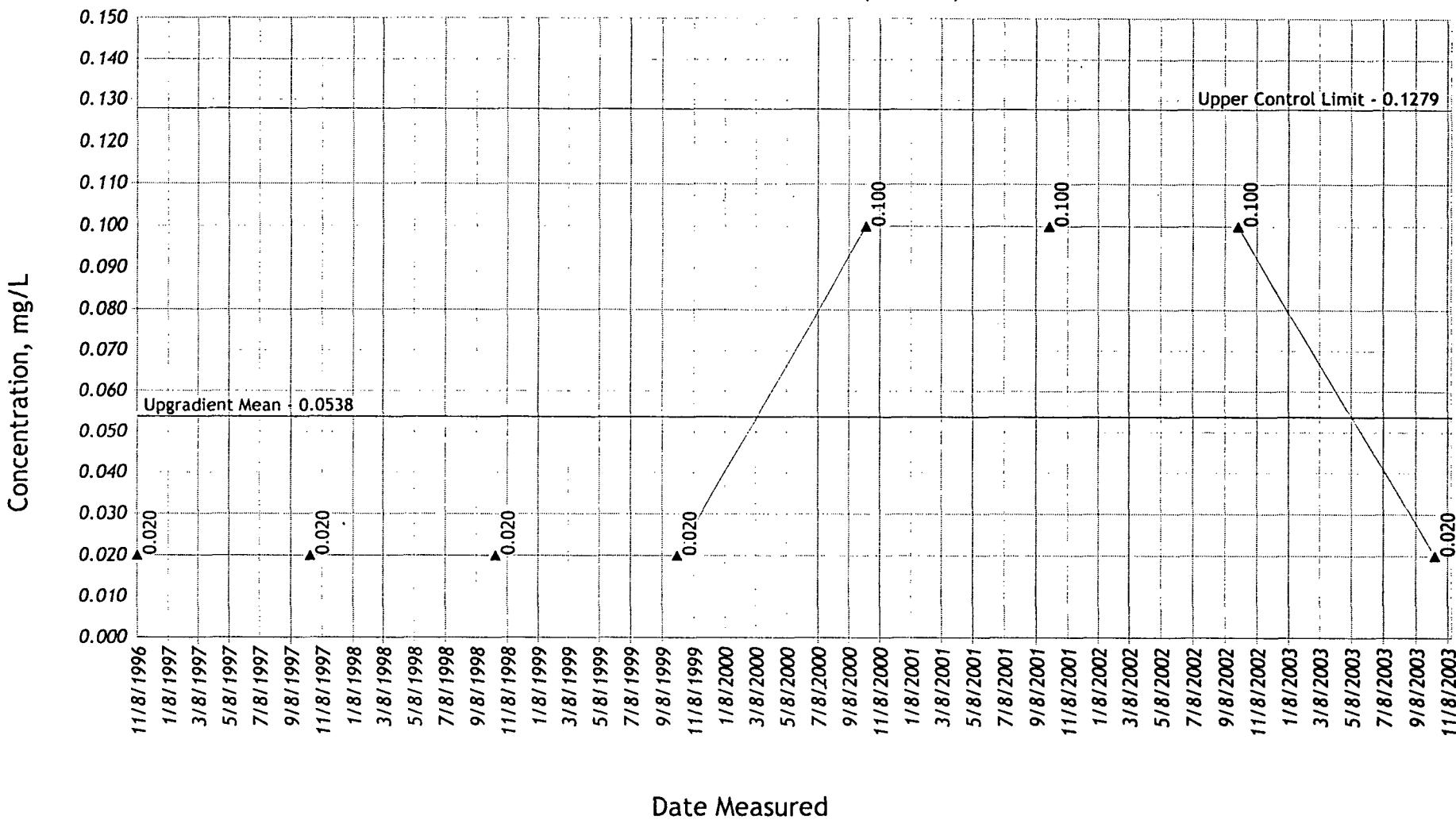


24

**Total Phenols**  
**Council Bluffs Construction and Demolition Landfill**  
78-SDP-01-89

03001  
11/14/2003 12:29:02 PM

### Total Phenols Trends - (MW-9)



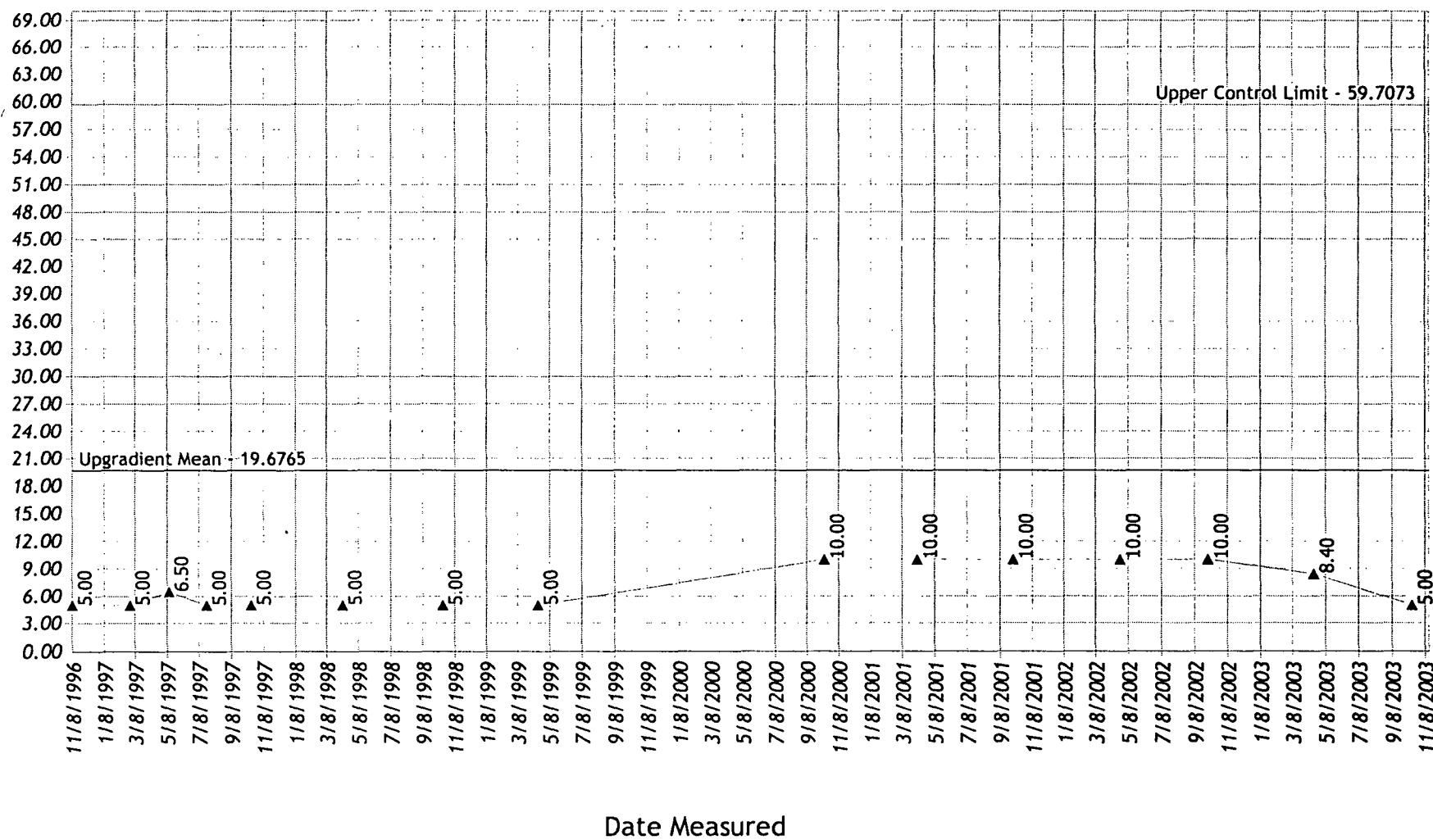
25

**Total Phenols**  
**Council Bluffs Construction and Demolition Landfill**  
 78-SDP-01-89

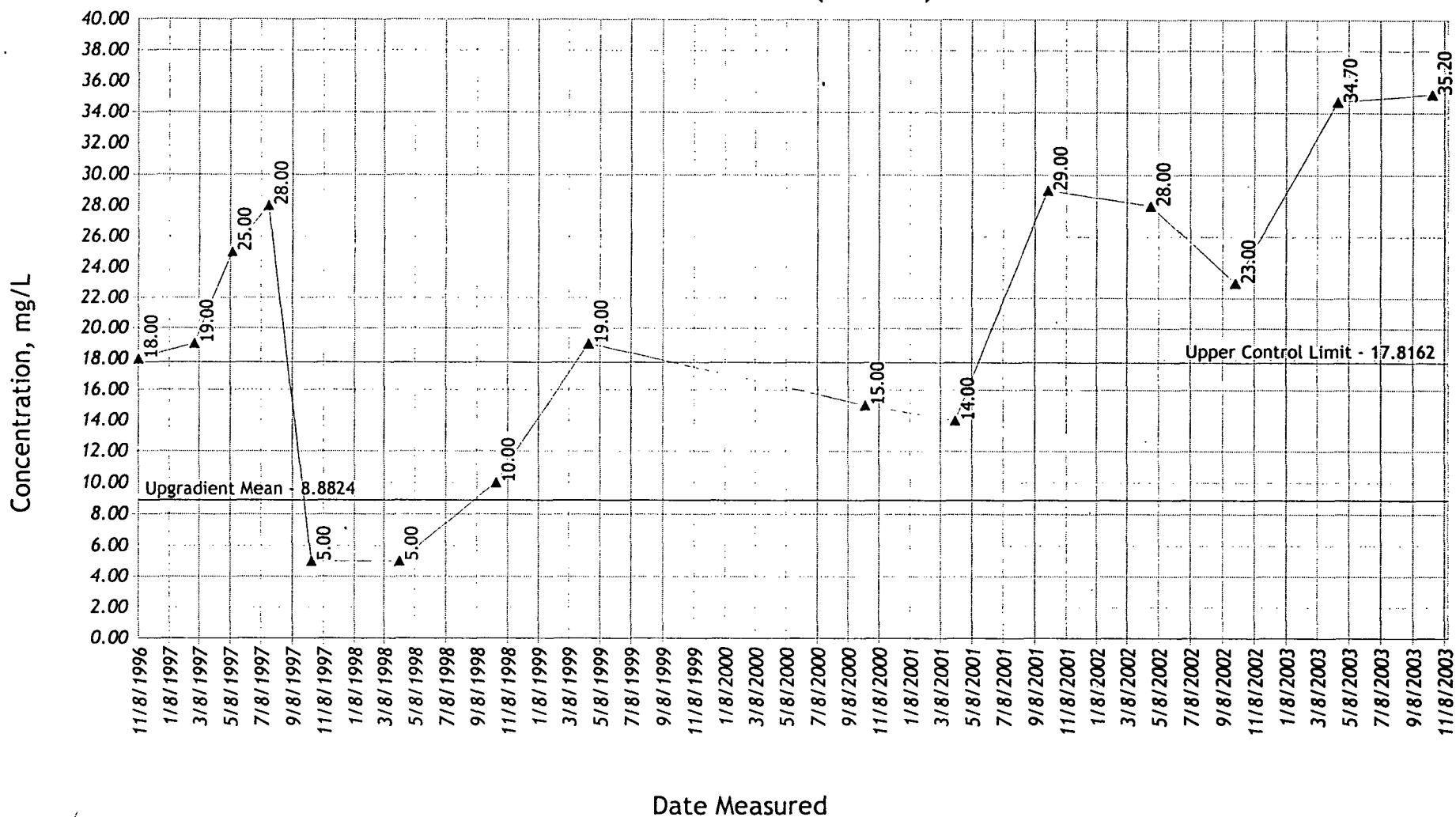
03001  
 11/14/2003 12:29:08 PM

## Chemical Oxygen Demand Trends - (MW-10)

Concentration, mg/L

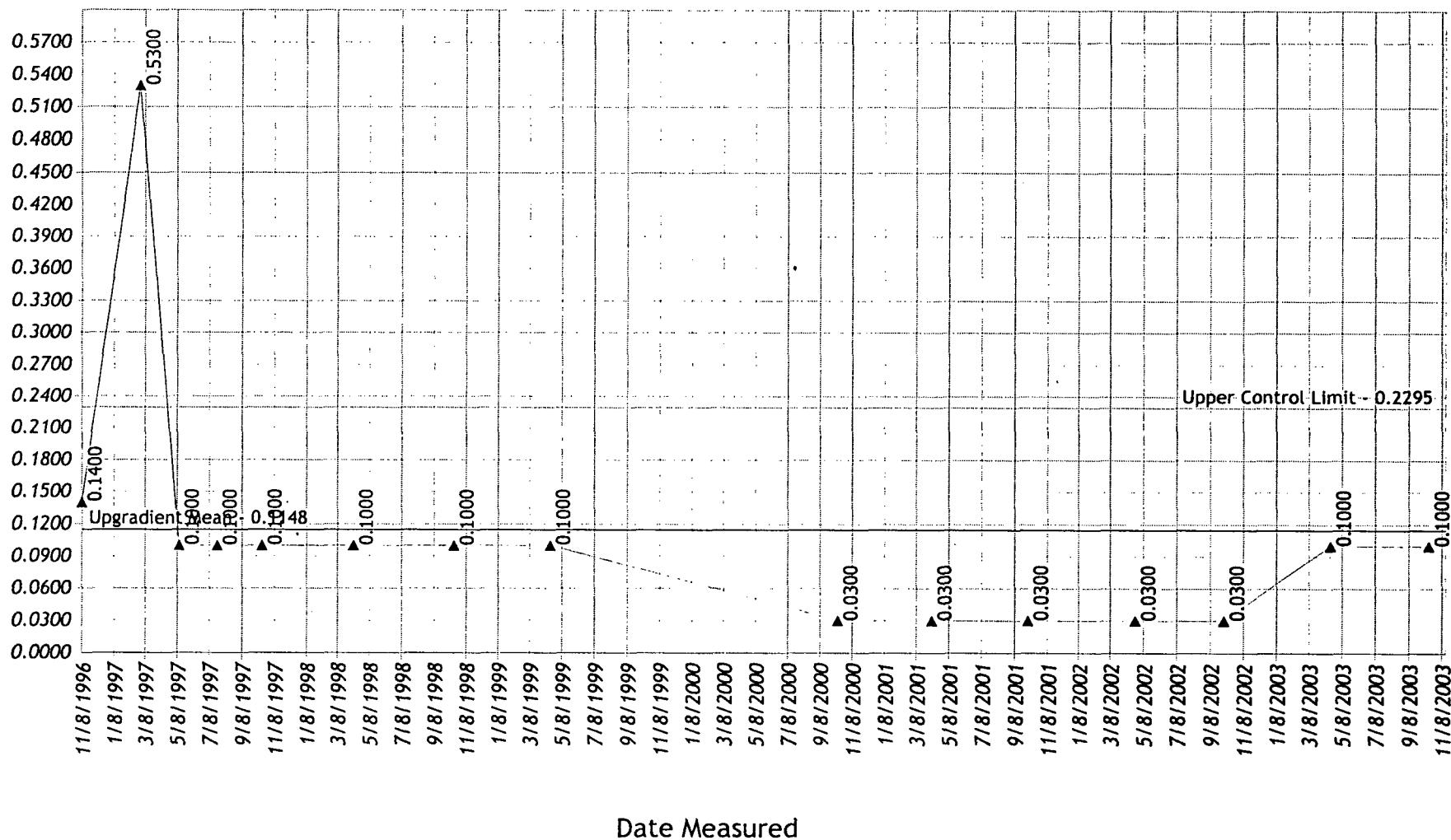


### Chloride Trends - (MW-10)



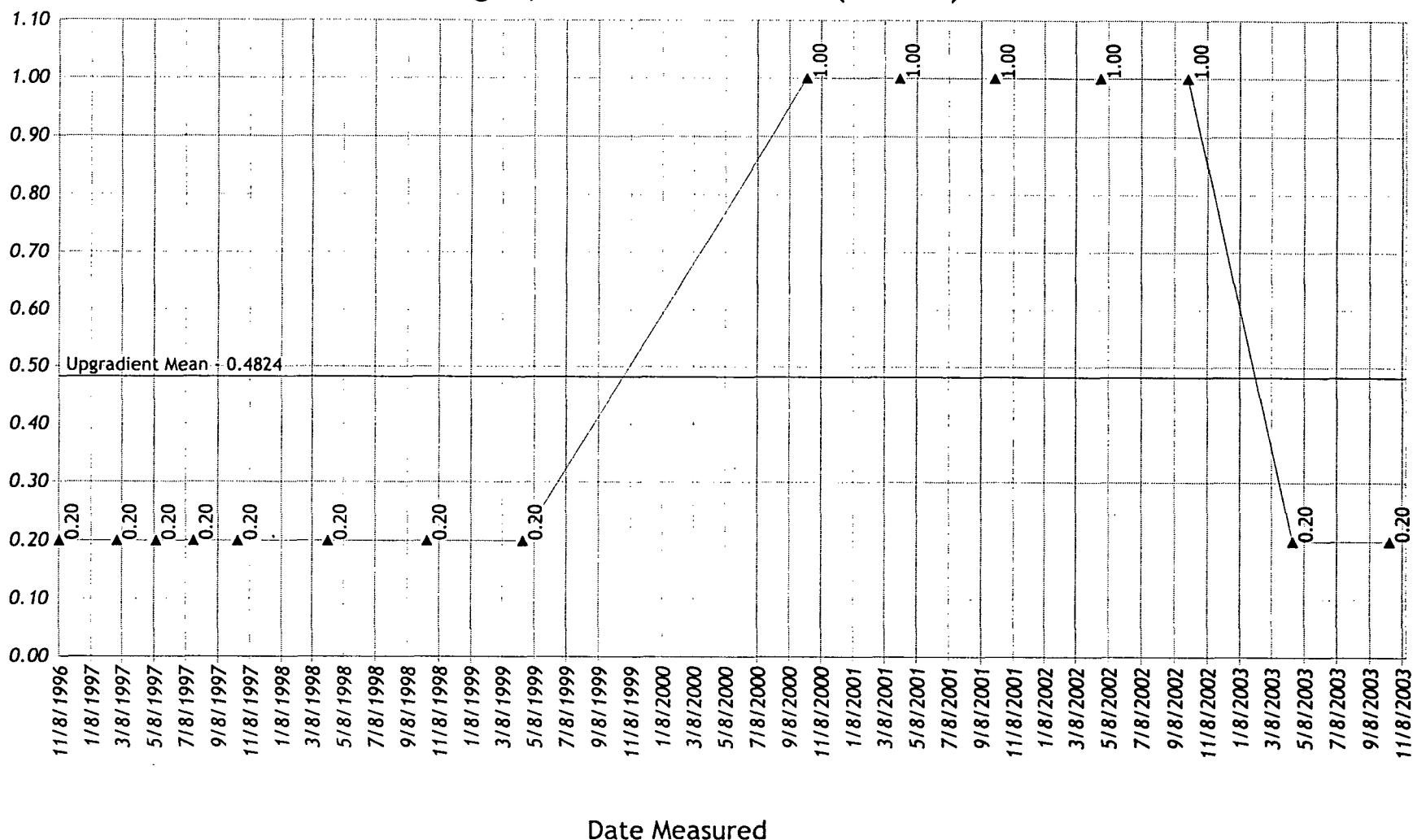
## Iron, Dissolved Trends - (MW-10)

Concentration, mg/L



## Nitrogen, Ammonia Trends - (MW-10)

Concentration, mg/L



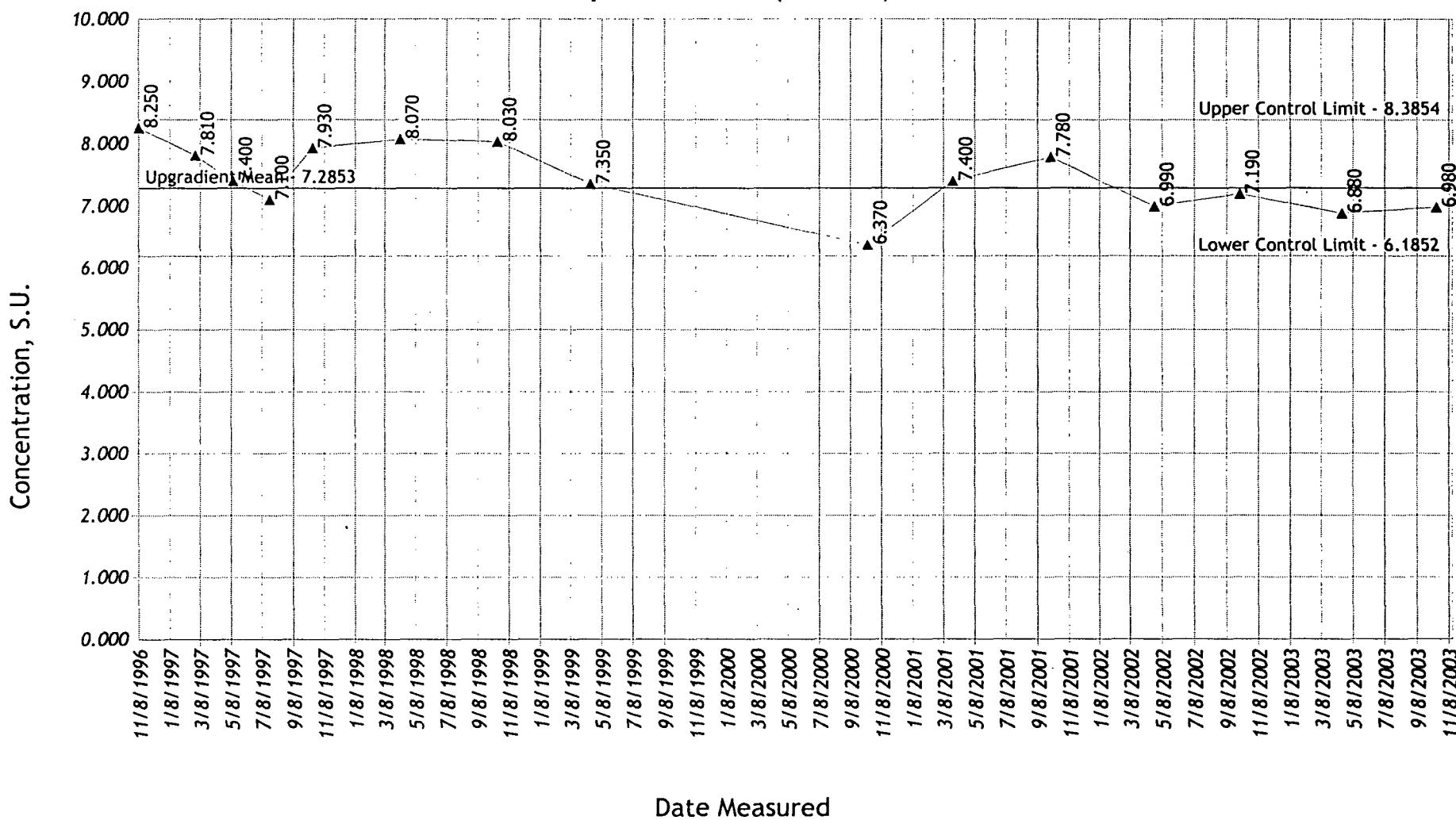
Note: The upper control limit is not shown as the standard deviation was not calculated due to consistent parameter non-detect in the up-gradient monitoring point.

29

**Nitrogen, Ammonia**  
**Council Bluffs Construction and Demolition Landfill**  
 78-SDP-01-89

03001  
 11/14/2003 12:29:50 PM

### pH Trends - (MW-10)



30

pH

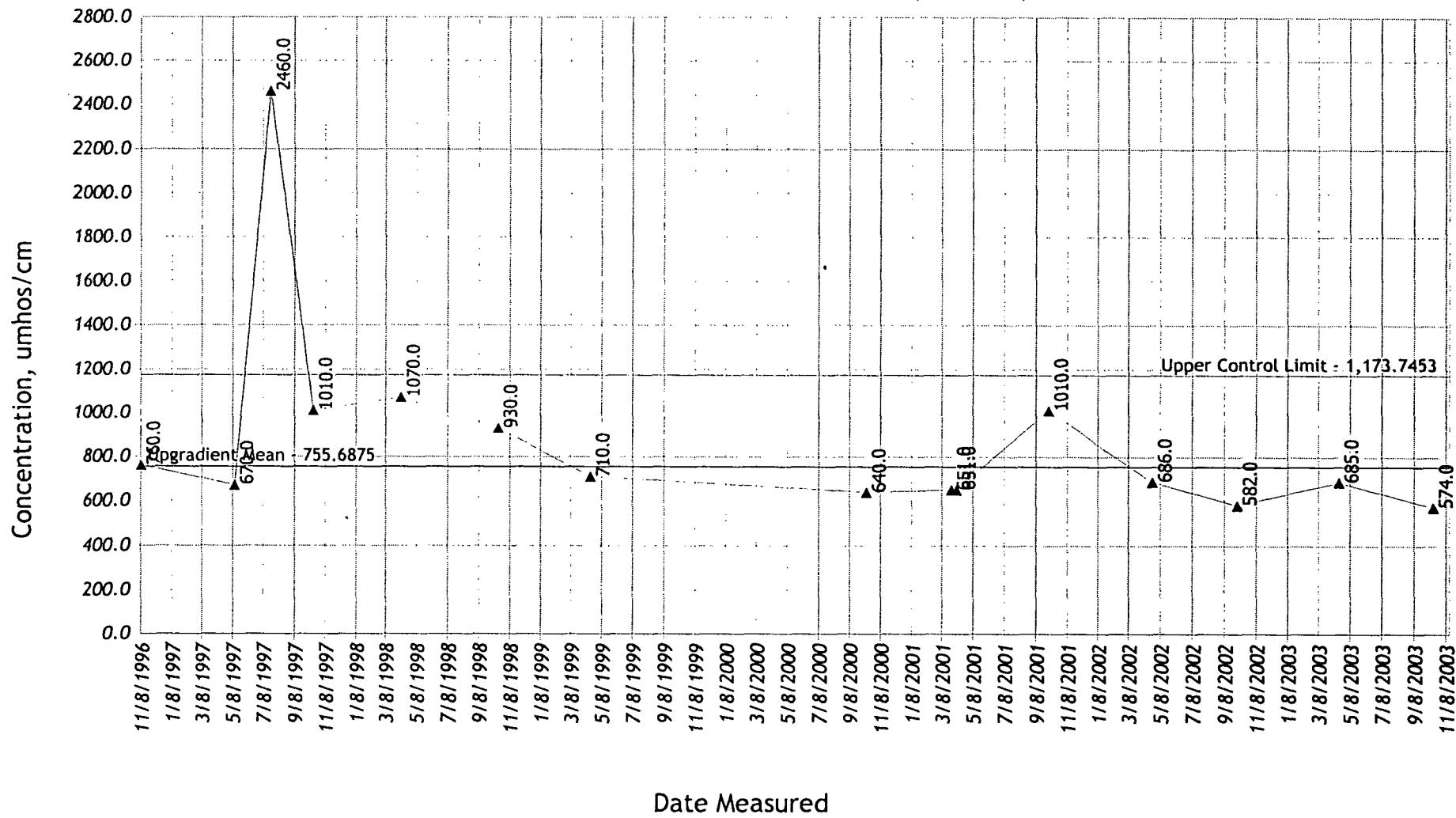
Council Bluffs Construction and Demolition Landfill

78-SDP-01-89

03001

11/14/2003 12:29:57 PM

### Specific Conductance Trends - (MW-10)

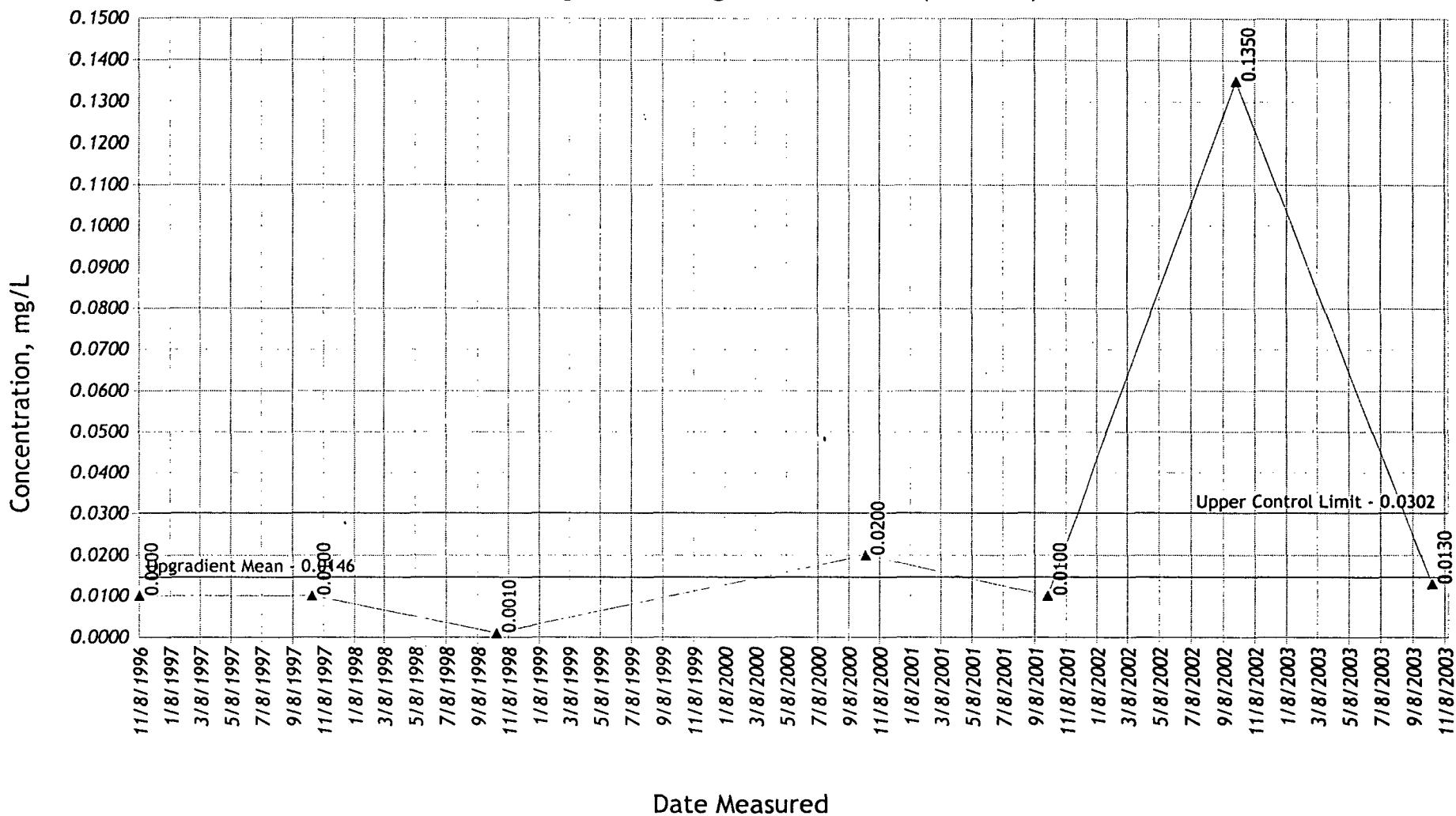


31

**Specific Conductance**  
**Council Bluffs Construction and Demolition Landfill**  
 78-SDP-01-89

03001  
 11/14/2003 12:30:04 PM

### Total Organic Halogens Trends - (MW-10)

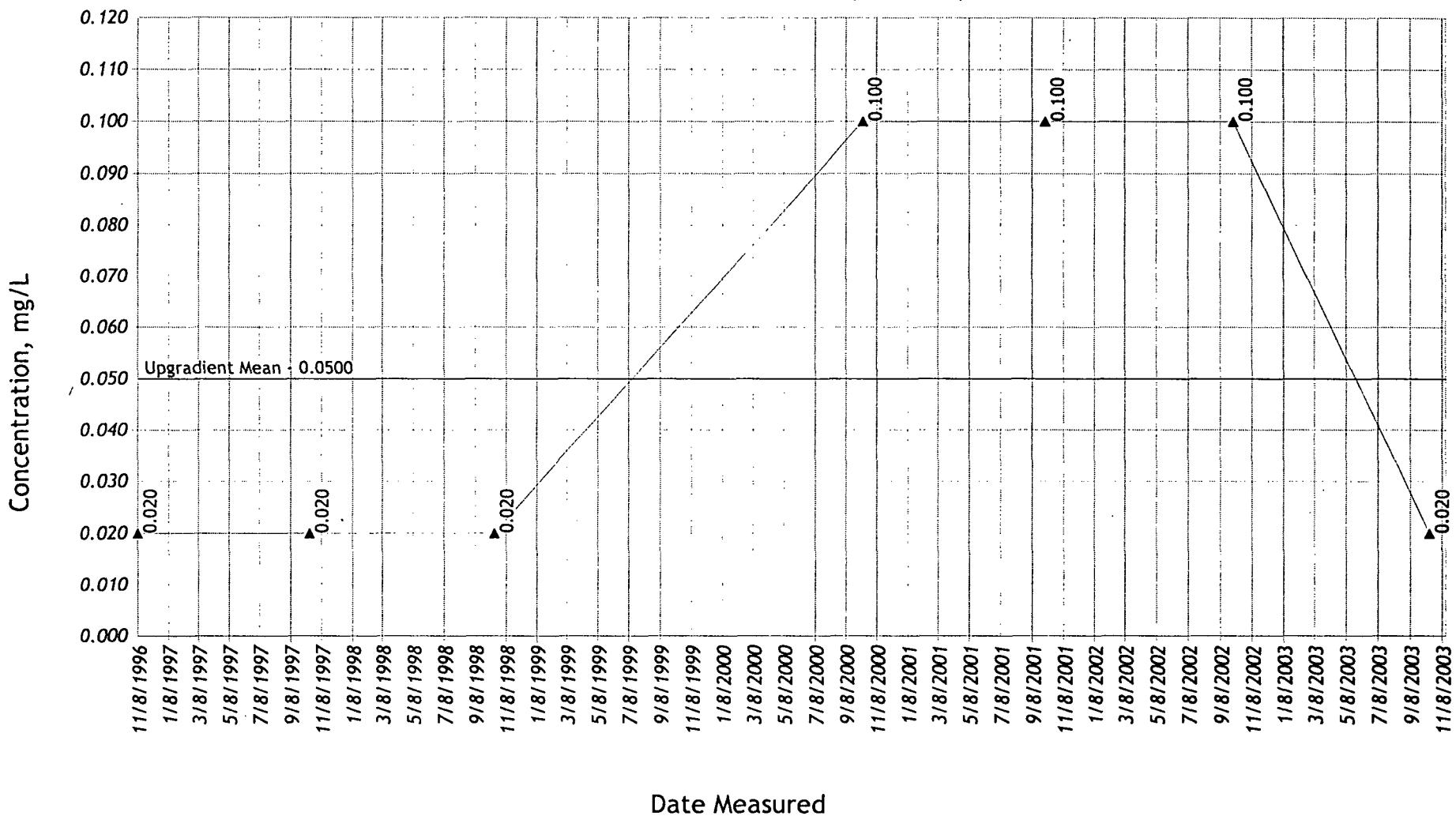


32

**Total Organic Halogens**  
**Council Bluffs Construction and Demolition Landfill**  
 78-SDP-01-89

03001  
 11/14/2003 12:30:10 PM

## Total Phenols Trends - (MW-10)



Note: The upper control limit is not shown as the standard deviation was not calculated due to consistent parameter non-detect in the up-gradient monitoring point.

**APPENDIX F**  
**MEASURED LEACHATE LEVELS**

**Anderson Excavating and Wrecking Company**  
20 SOUTH 15th STREET  
COUNCIL BLUFFS, IOWA 51501  
712/325-8111

### Council Bluffs Landfill Leachaide Tank Readings

Date Tank Levels Checked	Tank Level	Date Tank Pumped
12/4/2002	70%	
1/1/2003	70%	
2/5/2003	75%	
3/5/2003	85%	
4/2/2003	90%	
5/7/2003	95%	5/9/2003
6/4/2003	5%	
7/2/2003	10%	
8/6/2003	10%	
9/3/2003	20%	
10/1/2003	20%	
11/5/2003	30%	